COMPARISON OF DEXMEDETOMIDINE COMBINED WITH PROPOFOL VERSUS FENTANYL COMBINED WITH PROPOFOL FOR LARYNGEAL MASK AIRWAY INSERTION IN ELECTIVE SURGERIES PERFORMED UNDER GA

Dissertation submitted to

The Tamil Nadu Dr. M.G.R. Medical university

Chennai – 600032

With fulfilment of the regulations

for the award of Degree

M.D.ANAESTHESIOLOGY

BRANCH – X

DEPARTMENT OF ANAESTHESIOLOGY

K.A.P.V. GOVT. MEDICAL COLLEGE, TRICHY.

APRIL 2017

BONAFIDE CERTIFICATE

This is to certify that this dissertation titled **"COMPARISON OF DEXMEDETOMIDINE COMBINED WITH PROPOFOL Vs FENTANYL COMBINED WITH PROPOFOL FOR LARYNGEAL MASK AIRWAY INSERTION IN ELECTIVE SURGERIES PERFORMED UNDER GA – A RANDOMISED TRIAL"** is a bonafide work of **DR.S.PRIYADHARSINI**.., Post Graduate in M.D.Anaesthesiology, Department of Anaesthesiology, K.A.P.V. Government Medical College, Trichy and has been prepared by her under our guidance. This has been submitted in partial fulfilment of regulations of The Tamil Nadu Dr. M.G.R. Medical University, Chennai -32 for the award of M.D. Degree in Anaesthesiology.

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DECLARATION

I **Dr.S.PRIYADHARSINI.,** solemnly declare that this dissertation titled, **"COMPARISON OF DEXMEDETOMIDINE COMBINED WITH PROPOFOL Vs FENTANYL COMBINED WITH PROPOFOL FOR LARYNGEAL MASK AIRWAY INSERTION IN ELECTIVE SURGERIES PERFORMED UNDER GA – A RANDOMISED TRIAL"** is a bonafide work done by me at K.A.P.V. Government Medical College, during 2014-2017 under the guidance and supervision of **Prof.Dr.R.SELVAKUMAR., M.D.,D.A.,DNB.,** Head Of the department, Department of anaesthesiology. The dissertation is submitted to The Tamilnadu Dr. M.G.R. Medical University, towards the partial fulfilment of requirement for the award of M.D. Degree in Anaesthesiology, Branch X.

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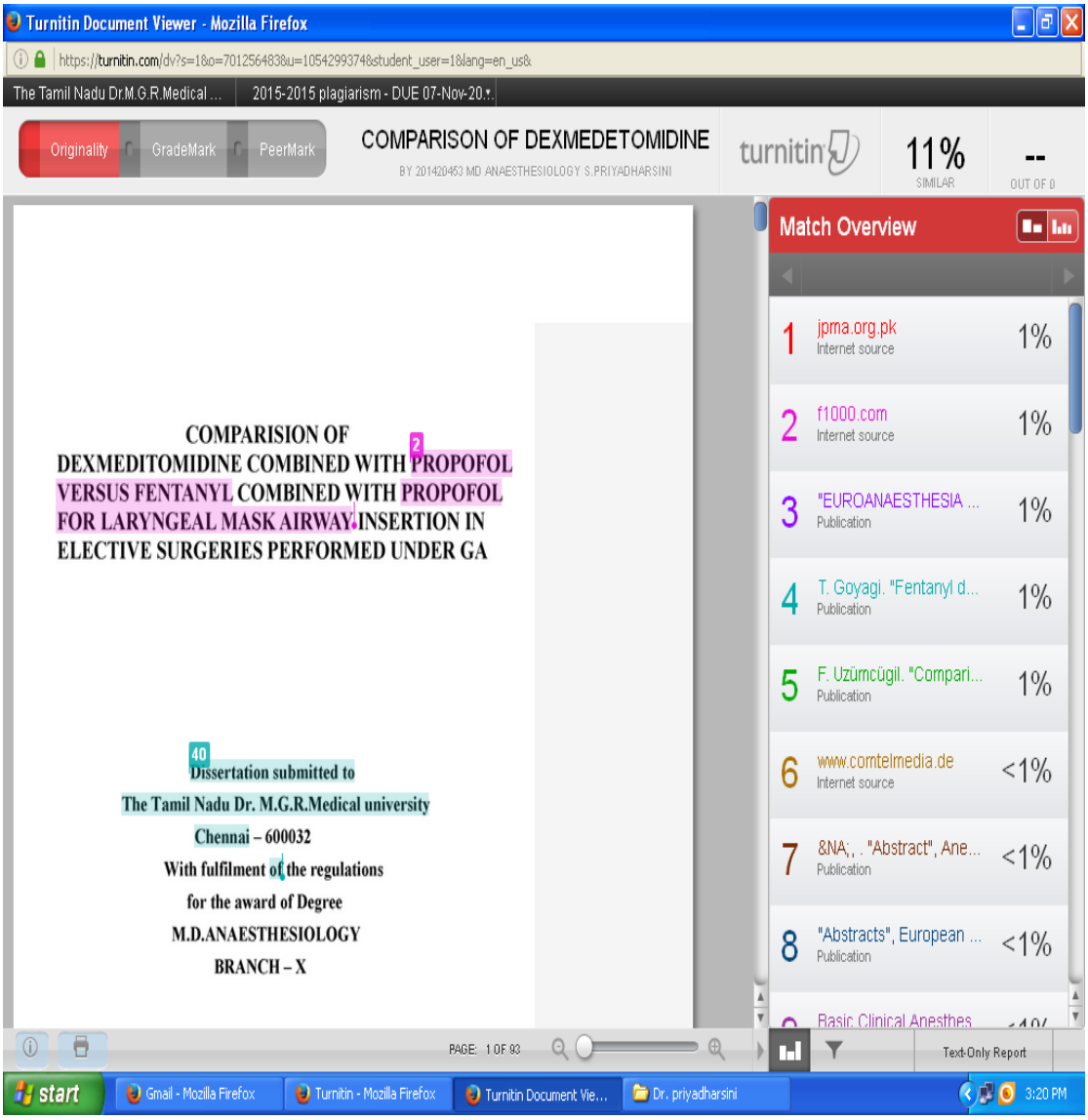
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ABBREVIATIONS

ASA	-	American society of Anaesthesiologist
BIS	-	Bispectral Index
BP	-	Blood pressure
cAMP	-	Cyclic adenosine monophosphate
CO_2	-	Carbondioxide
COPA	-	Cuffed oropharyngeal airway.
CPCR	-	Cardiopulmonary cerebral resuscitation
DEX	-	Dexmedetomidine
ECT	-	Electro convulsive therapy
GABA	-	Gamma amino butyric acid
GIT	-	Gastro intestinal tract
ILMA	-	Intubating LMA
Im	-	Intramuscular
IV	-	Intravenous
K^+	-	Potassium
LMA	-	Laryngeal mask airway.
LT	–	Laryngeal tube
LTS	-	Laryngeal tube suction
MAP	-	Mean Arterial Pressure
Mcg	-	Microgram
NMDA-N	-	Methyl d-Aspartate
PAX	-	Pharyngeal airway express
PLMA	-	Proseal LMA
SLIPA	-	Streamlined airway of the pharynx airway

INTRODUCTION

Laryngeal mask airway is the most commonly used Supraglottic airway devices for short surgical procedures performed under general anaesthesia because it requires lesser plane of anaesthesia for insertion and it is less stimulating than that of endotracheal tube. LMA insertion needs adequate mouth opening and suppression of upper airway reflexes for its proper placement. Various induction techniques used for insertion of LMA are

1. Inhalational induction

Inhalational agents when used alone requires longer time to achieve the desired depth of anaesthesia. The major disadvantage of inhalational induction is its cost as it requires higher concentration for induction. Chance of theatre pollution is also high with inhalational induction.

2. Intravenous induction

Intravenous induction can be either a single or a two drug method in which a drug is combined with either a muscle relaxant or an inhalational agent or any other anaesthetic agents. Intravenous Induction agents when used alone mandates usage of higher doses causing adverse side effects of the drug. Use of muscle relaxants increases the incidence of post operative myalgia.

COINDUCTION TECHNIQUE:

Coinduction technique is defined as administration of smaller doses of either a sedative or other anaesthetic agents just before primary induction agent to reduce the total dose of an induction agent.

The use of co induction technique thereby decreases the incidence and duration of side effects caused by the primary induction agent. Also the use of co induction technique improves the conditions for ease of insertion of LMA. Drugs commonly used as coinduction agents are

1. Opioids like Fentanyl, Alfentanil, Remifentanil
2. Benzodiazepines like Midazolam
3. Alpha 2 agonists like Clonidine and Dexmedetomidine

Opioids are the most popular adjuvants used to improve the insertion conditions for LMA, of which Fentanyl is the most commonly used drug for its analgesic property and easy availability.

Dexmedetomidine is the selective alpha2 agonist with both anaesthetic and analgesic properties. Unlike Propofol and Fentanyl it produces sedation without any risk of respiratory depression.

Here in my study, I decided to compare the efficacy of Propofol combined either with Dexmedetomidine or Fentanyl in providing good insertion conditions for laryngeal mask airway.

AIMS AND OBJECTIVES

To compare the efficacy of Dexmedetomidine combined with Propofol and Fentanyl combined with Propofol for laryngeal mask airway insertion in terms of

1. Ease of insertion and
2. Hemodynamic responses to LMA insertion.

LARYNGEAL MASK AIRWAY

Laryngeal Mask Airway (LMA) is the useful supraglottic airway device, both for general anaesthesia and for emergency airway maintenances. It was designed by Dr.Archie Brain in the year 1983 and it came into clinical use in the year of 1988. Since its inception, LMA has undergone various modifications to suit different difficult airway scenarios[1]. Different induction methods and insertion techniques have been studied to find an optimal insertion method for LMA during different situations.

INDICATIONS:

1. Elective ventilation

LMA is used as an alternate to endotracheal tube for short and elective surgical procedures performed under general anaesthesia.

2. Difficult airway[2]

As a rescue device during failed or difficult intubation.

3. Cardiac arrest

During cardiac arrest, LMA can be used as an alternate to tracheal intubation as per American Heart Association guidelines for CPCR.

4. Conduit for intubation

ET tube can be passed through the intubating LMA either directly or through the bougie when intubation is unsuccessful and LMA is used for rescue ventilation.

5. As a bridge to Extubation.

CONTRAINDICATIONS:

1. Patients with risk of aspiration.
2. Patients with upper airway obstruction like tumour or abscess.
3. Restricted mouth opening.
4. Patients with disrupted upper airway anatomy.
5. Morbid obesity.
6. Stiff lungs.

CLASSIFICATION OF SUPRAGLOTTIC

AIRWAY DEVICES

Based on the sealing mechanism, supraglottic devices are classified[3] as follows.

A. *Cuffed Perilaryngeal sealers*:

1. Non directional sealers

   Examples : LMA, ILMA, Soft seal

2. Directional sealers

   Example: PLMA

B.*Cuffed pharyngeal sealers*

1. Without oesophageal sealing

   Examples: COPA, PAX

2. With oesophageal sealing

   Examples: Combitude, LT, LTS

C. *Cuffless preshaped sealers*

Examples: SLIPA, I-Gel, Baska mask.

CLASSIC LMA

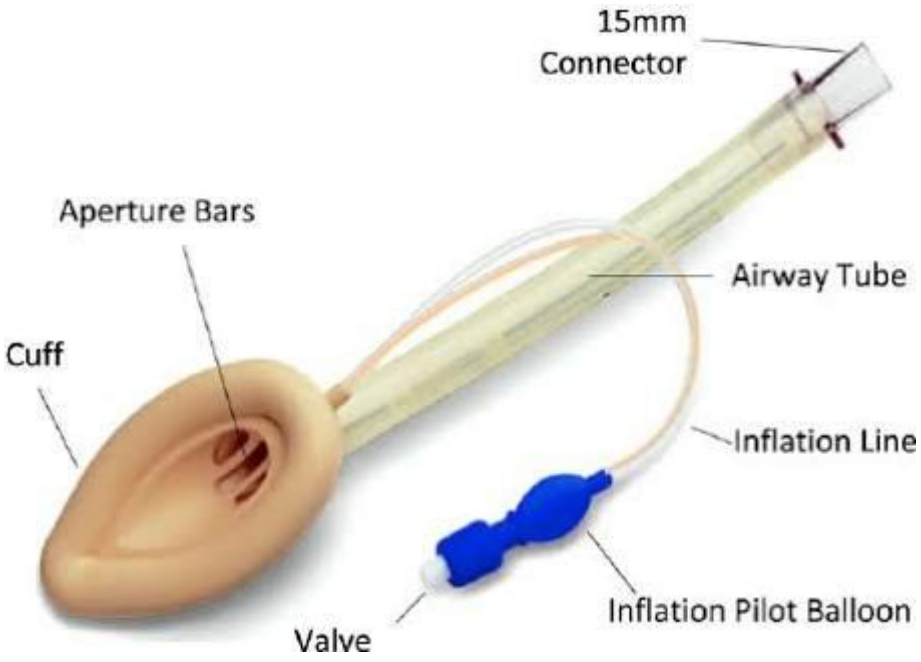


Figure 1: CLASSIC LMA

It is a reusable device made of silicone. Three main components of classic LMA are

-Airway tube,

-Mask

-Mask inflation line

The airway tube contains large bore tube with 15mm connector on one end and mask at the other end fitted at an angle of 30*. Mask is an elliptical inflatable silicone cuff to seal the laryngeal inlet. Two aperture bar guards the distal opening of the tube to prevent obstruction by the epiglottis. The proximal wider end of the mask contains the inflation line with self sealing pilot balloon.

Eight sizes of LMA classic is available and is designed to fit most airways from neonates to adults. It is reusable upto forty times and it can be sterilised by steam autoclaving. The appropriate size LMA for the patient is selected based on the weight. In paediatric patients, the appropriate sized LMA can be determined by matching the widest part of the mask of LMA with the width of second to fourth fingers. If the LMA selected is too small for the patient, it will lead to air leak on positive pressure ventilation whereas the large LMA if selected will cause lingual nerve injury and the incidence of postoperative sore throat will be very high. The large LMA also tends to come up into the mouth and it will decrease the working space for the surgeons in case of oral procedures.

TABLE 1: VARIOUS SIZES OF CLASSIC LMA[4]

WEIGHT(KG)	LMA SIZE	AIR INFLATION VOLUME(ML)
<5	1	4
5-10	1.5	7
10-20	2	10
20-30	2.5	14
30-50	3	20
50-70	4	30
70-100	5	40
>100	6	50

PREINSERTION PREPARATION:

VISUAL INSPECTION

The whole external surface of the LMA along with the tube should be inspected for any discolorations, cuts, tears, scratches and presence of any foreign particles. The interior of the LMA should also be clean with no particulate matters inside. Aperture should be examined for free space between the two aperture bars and the connector should fix snuggly to the outer end of the airway tube.

CUFF INFLATION/ DEFLATION[5]

The air from the cuff is withdrawn so that the walls get flattened against each other and left in place. The cuff should not reinflate. If it reinflates, it indicates the leaking cuff or faulty valve. The leaking cuff also will not reinflate after cuff deflation.

The cuff is then reinflated with 1.5 times the volume of the recommended inflation volume and left for 2 minutes. The cuff must hold the pressure for 2 minutes and it should be elliptical in shape. Herniation if any, wall thinning or wall asymmetry is an indication to discard the LMA.

MASK PREPARATION

LMA cuff should be deflated completely to create the stiff thin leading edge to wedge the tip behind the cricoid cartilage. The back of the cuff should be lubricated prior to insertion with water soluble jelly. The front part should not be lubricated as it may block the aperture bars and may lead on to aspiration of the lubricant.

INSERTION TECHNIQUES:

1. STANDARD INSERTION METHOD

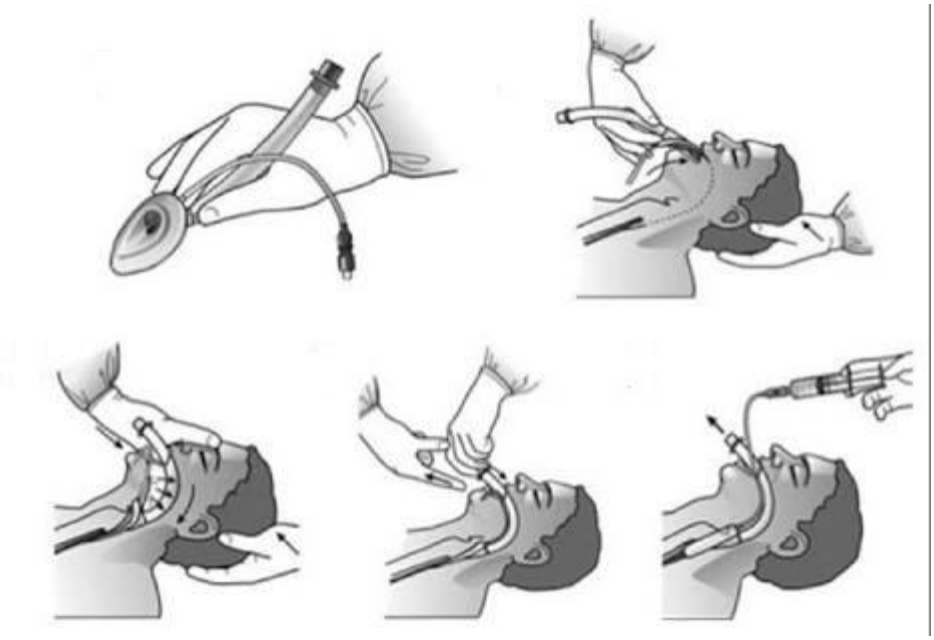


Figure 2: STANDARD INSERTION TECHNIQUE

In Standard or classical insertion technique, LMA is fully deflated and it is lubricated with water based jelly on its posterior surface. The LMA should be holded like a pen with index finger placed at the junction of cuff and the airway tube. LMA is then pressed along the palato-pharyngeal curvature of the oropharynx using the index finger with the patient in sniffing position[6] and it is inserted. It is further pushed down till the resistance is felt. After placing, hold the tube with other hand while withdrawing the inserted finger and inflate the cuff without holding the tube. This allows proper placement of LMA where the cuff is placed in the hypopharynx and the sides faces the pyriform fossa. Behind the

tongue base will be the upper border of the cuff. Cuff inflation should be done to *THE PRESSURE JUST ADEQUATE TO SEAL OR TO MAXIMUM PRESSURE OF 60CM OF H2O*[7] which is the perfusion pressure of the pharyngeal mucosa. If the cuff pressure exceeds 60 cm H2O, it will lead to injury to the pharyngeal mucosa and the incidence of postoperative sore throat will be very high.

180* ROTATION METHOD:

In this method, LMA is inserted so that the concave side faces the palate. Once the oropharynx is reached, it is then rotated 180^{o} counter clockwise and pushed further down to its final position of seating. It is found to be useful in paediatric age group and the main disadvantage of this technique is arytenoid dislocation and injury.

THUMB INSERTION TECHNIQUE:

In this technique, pressure against the hard palate is exerted using thumb when the LMA is advanced. Here the thumb is used to hold the LMA in the place of index finger used in classical insertion technique. In conditions where the head end of the patient could not be reached, thumb insertion method can be used. The thumb is advanced as far as possible while the other fingers are stretched over the patients face and the tube is pushed in to its final position with the help of other hand. The thumb is then removed after positioning of the LMA. The operator

should stand at the right or left side of the patient facing towards the patient for insertion of LMA.

PARTIAL OR FULL INFLATION TECHNIQUE[8]

The another technique is to partially or fully inflate the cuff before insertion of LMA. Although this technique offers some advantages with an inexperienced user, the device may get mal positioned. However, the incidence of sore throat is reduced with the partial inflation technique.

CONFIRMATION OF CORRECT PLACEMENT OF LMA:

A. INSERTION SUCCESS

1. During cuff inflation, the LMA will rise up if properly seated.
2. Filling up of anterior neck with cuff inflation.
3. LMA should be in the midline , the posterior black line of airway tube should also remain in line with the upper incisors.

B. OPTIMAL VENTILATION

1. Adequate chest expansion
2. Presence of equal breath sounds over all the lung fields and absence of ventilator sounds over the epigastrium.
3. Stable oxygenation
4. Square wave capnograph.

FIXATION OF LMA[9]:

To improve the stability and to prevent the patient from biting the tube, a bite block must be kept beside the tube. Keeping the LMA in the centre of the mouth, Fixation of the tube must be accomplished with two tapes, one from maxilla to maxilla and the other from zygoma to zygoma under the mandible. The tube should not be bent against its natural curvature in order to prevent obstruction. Any traction of the breathing circuit over the tube should be avoided to prevent any dislodgement of LMA.

COMPLICATIONS[10] ASSOCIATED WITH LMA:

1. Sore throat,
2. Gastric insufflation leading onto Gastric regurgitation and pulmonary aspiration.
3. Trauma to upper airway structures,
4. Hypoglossal nerve palsy,
5. Epiglottis infolding leading on to coughing, laryngospasm, airway obstruction.

ADVANTAGES OF LMA:

A. Over Facemask

1. More secure and reliable than face mask.
2. Hands free maintenance of airway.

B. Over Endotracheal tube

1. LMA insertion is less stimulating than direct laryngoscopy and ETT insertion.
2. LMA can be tolerated at lighter planes of anaesthesia.
3. LMA placement requires minimal training and also it does not require neuromuscular blockade.
4. LMA can be used as a rescue device in cant ventilate and cant intubate situations.

DISADVANTAGES OF LMA:

A. Over facemask

Incidence of sorethroat is higher with LMA (17%) as compared to facemask (3%)

B. Over Endotracheal tube

1. LMA is not a definite airway as it does not protect against aspiration.
2. LMA could not be used in patients with
    - Stiff lungs
    - Restricted mouth opening and
    - Upper airway abnormality.

FENTANYL

Opioids refer to all the substances either natural or synthetic that binds to opioid receptors and produce some agonistic effects. Opioids produce analgesia without any loss of consciousness, touch and proprioception.

Fentanyl was first synthesised by Paul Janssen in 1960. Fentanyl is a synthetic opioid with pure agonistic actions. It is a phenyl piperidine derivative with analgesic and anaesthetic properties. It selectively binds to the mu receptors in the central nervous system mimicking the effects of endogenous opioids.

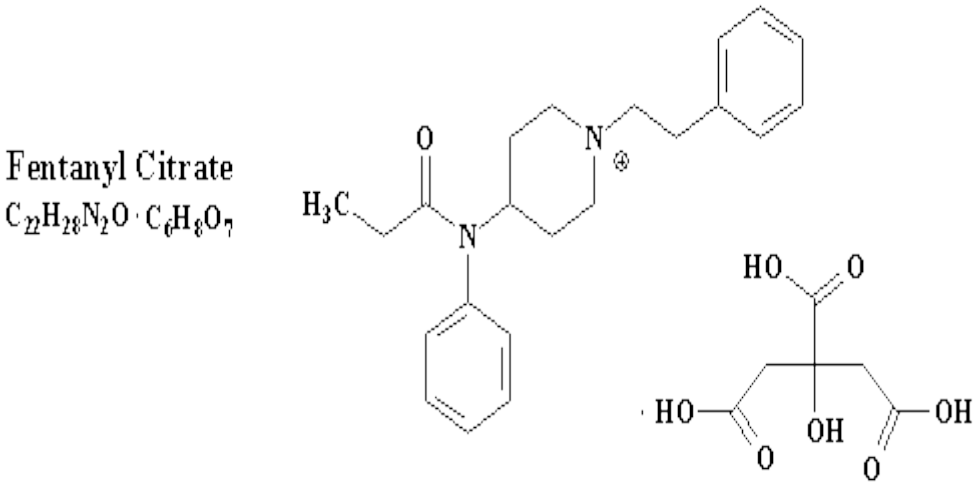


Figure 3: CHEMICAL STRUCTURE OF FENTANYL

MECHANISM OF ACTION OF OPIOIDS

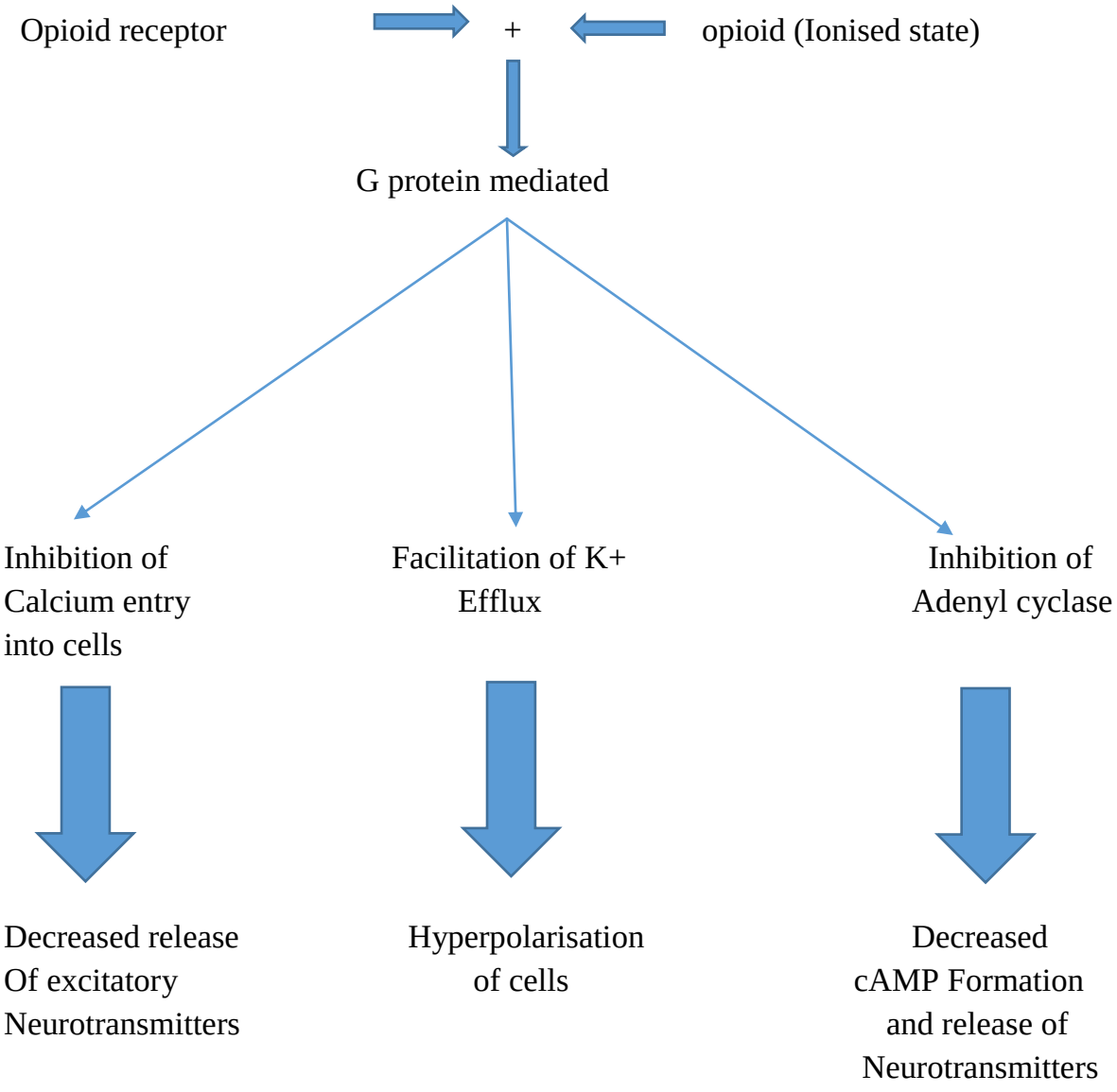


Figure 4: MECHANISM OF ACTION OF OPIOIDS

Opioids binds to opioid receptors both at the pre and post synaptic sites present in the central nervous system mainly at the brain stem and spinal cord. Ionised state of opioids must be responsible for binding with the opioid receptors. Opioids induces inhibition of acetyl choline release from the nerve endings leading to depression of cholinergic transmission in the central nervous system and thereby producing analgesia and other opioid agonistic effects. Thus opioids do not block the conduction of nerve impulses via peripheral nerves and they also do not alter the responses to noxious stimuli via afferent nerve endings.

PHARMACOKINETICS

Fentanyl is a lipophilic opioid with huge volume of distribution 4L/kg body weight.80% of the drug is plasma protein bounded mainly with alpha 1 acid glycoprotein and less than 10% remain as unionised fraction.

Onset time	:	1-2 minutes IV
		8 minutes IM
Peak	:	3-5 minutes IV
Duration of action	:	30 minutes -1 hour IV
		1-2 hours IM

Fentanyl has high first pass uptake by lungs for about 75%and this limits the drug that reaches the systemic circulation after the initial IV dose. Also it has high hepatic extraction ratio (nearing 1). Secondary peak level occurs in the plasma after some hours of last IV dose due to release of sequestered drug from

the GIT and lungs leading to longer duration of analgesia and delayed respiratory depression. It is metabolised in the liver by N-demethylation to pharmacologically Inactive metabolites called Nor fentanyl, Hydroxyl proprionyl fentanyl and Hydroxyl proprionyl nor fentanyl which is excreted via urine.

Context sensitive half life:

During prolonged infusions, the peripheral compartments with inactive tissue sites gets saturated with fentanyl. Hence when the fentanyl infusion is discontinued, fentanyl from the tissue reservoir enters the central compartment and replaces the drug eliminated by hepatic metabolism. Thus the context sensitive half life of fentanyl is increased and it is found to be more than 2 hours.

DRUG DOSAGES

Intravenous dose	:	0.5-150 mcg/kg
Spinal dosage	:	25 mcg
Epidural dosage	:	50-100 mcg

PHARMACODYNAMICS

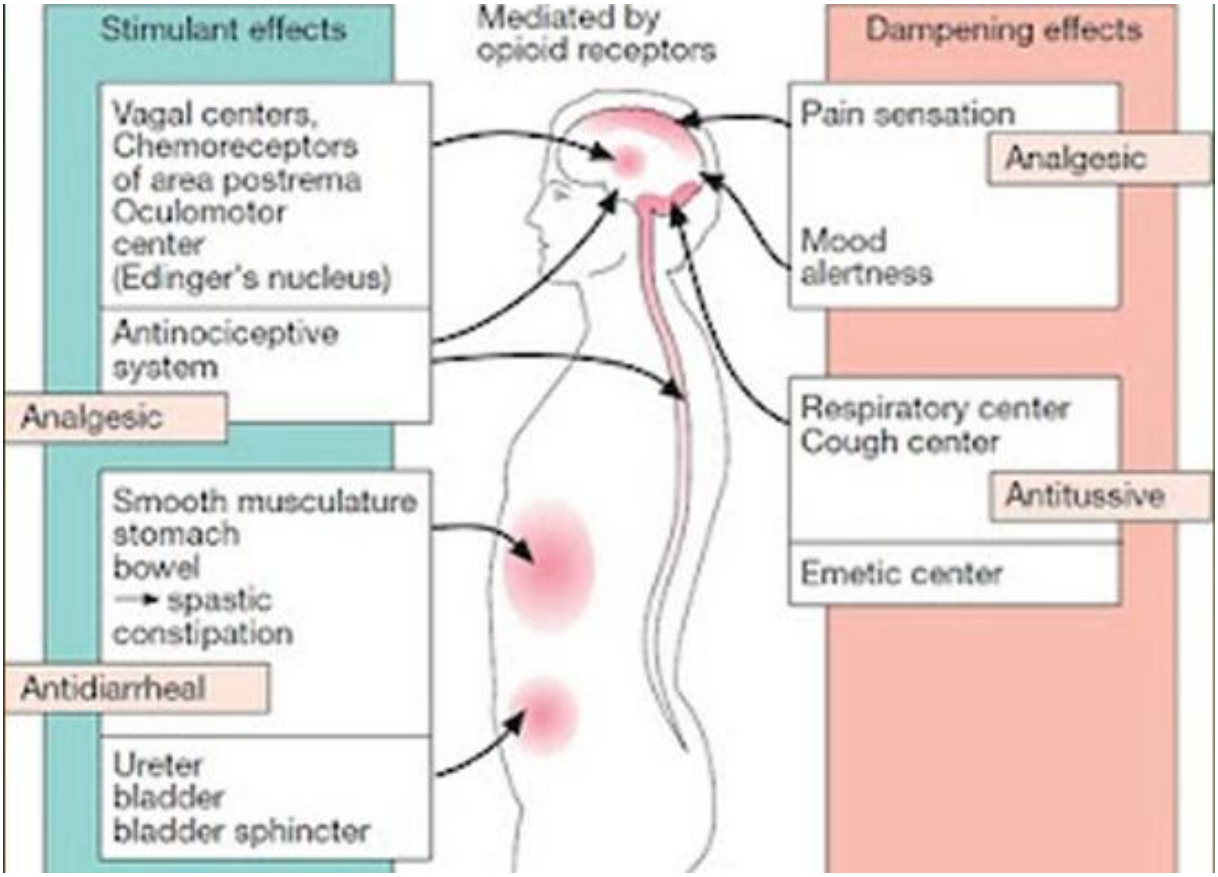


Figure 5: PHARMACODYNAMICS OF FENTANYL

1. Analgesia

Analgesia[11] due to opioids has two components ,

a) Spinal and

b) Supraspinal analgesia.

Spinal component is due to action on substantia gelatinosa of the dorsal horn whereas the action on medulla, midbrain, limbic system and cerebral cortex causes supraspinal analgesia.

1. Cardiovascular system

Fentanyl causes vagal mediated bradycardia[12]. When used along with other anaesthetic agents like N2O, benzodiazepines, barbiturates etc, it may cause significant myocardial depression. Carotid sinus baroreceptor reflex control of heart rate is markedly depressed by fentanyl at the dose of 10mcg/kg IV. Opioids increases the myocardial resistance to oxidative and ischemic stresses and thus executing the myocardial protection.

2. Respiratory system

Opioids are potent respiratory depressants[13]. Decrease in respiratory rate is more when compared to tidal volume. Respiratory depression is dose dependent and via direct action on respiratory centre located in medulla leading to periodic breathing and prolonged pauses in between breaths. CO2 responsiveness and hypoxic ventilatory drive, both are depressed.

Opioids also triggers chemoreceptor trigger zone and suppresses cough reflex making the patient more prone for aspiration.

Fentanyl has large volume of distribution leading on to second peak and delayed respiratory depression. It also blunts the response to laryngoscopy and airway manipulation.

Opioids also produces decrease in ciliary activity in the airways in the dose dependent manner.

Significant reflex coughing may occur during pre induction dose of opioids due to the stimulation of juxta capillary irritant receptors or imbalance between sympathetic and parasympathetic innervations of the airway.

1. Muscle Rigidity

Fentanyl and its congeners are known to produce skeletal muscle rigidity leading to stiff chest syndrome. Rigidity can appear during Induction, Emergence or many hours after the last dose of opioids. Clinically this is most important, because it can lead onto difficulty in mask ventilation and increase in intra thoracic pressure while attempting positive pressure ventilation. Forceful mask ventilation against a closed glottis opening may result in entry of air into the stomach making the patient more prone for aspiration.

Striato niagral pathways are considered to be responsible for opioid induced muscle rigidity. It can also manifest as the tonic posturing of the body or seizure like tonic clonic movement of the hand and foot.

Treatment of stiff chest syndrome**:**

- Neuromuscular blocking agents
- Naloxone

Prophylaxis of stiff chest syndrome**:**

-Priming with Non depolarising muscle relaxants.

-Slow, Intermittent, Smaller doses of opioids.

-Use of inhalational agents.

5. Central nervous system

Opioids stimulates 4 centres

-Vagal centre causing bradycardia

-Edinger westphal nucleus causing miosis

-Chemoreceptor trigger zone causing vomiting.

-Scratch centre causing Pruritis[14].

Opioids depresses 4 centres

-Cough centre

-Respiratory centre

-Temperature regulating centre

-Vasomotor centre

Effects on Mood and Subjective behaviour:

-Loss of apprehension[15]

-Detachment

-Lethargy

-Mental clouding

-Inability to concentrate.

Opioid treatment of prolonged duration affects hypothalamic-pituitary-adrenal axis and hypothalamic-pituitary-gonadal axis leading to decreased follicle stimulating hormone, oestrogen and testosterone. It also increases prolactin levels.

6. Gastrointestinal system

Opioids slows the gastric emptying time via central and peripheral mechanisms. The central mechanism is vagal mediated. The peripheral mechanism acts via myentric nerve plexus of small and large intestine. Increased tone and decreased propulsive movement of both the small and large intestine leads to constipation. Biliary spasm may be precipitated due to contraction of sphincter of oddi leading to epigastric distress and biliary colic. Naloxone or Glucagon 2mg IV relieve the biliary colic produced by opioids. Vomiting can be induced by decreased gastro intestinal motility, Prolonged gastric emptying time[16] and stimulation of chemoreceptor trigger zone which is present in the floor of the fourth ventricle.

7. Placental transfer

As opioids are readily transported across the placenta, administration of opioids during labor to the mother depresses the neonate due to trans placental transfer of the drugs.

OPIOID ANTAGONISM:

NALOXONE:

It is a pure antagonist and it is a N-alkyl derivative of oxymorphone. It is active at mu, kappa, delta receptors but has greatest affinity for mu receptors.

PHARMACOKINETICS OF NALOXONE:

Onset of action : 1-2 mins

Duration of effect : 30-60 mins.

It gets metabolised in liver by Glucuronide conjugation and excreted via urine. Dosage – 0.5-1.0 mcg/kg boluses are given every 2-3 minutes until the desired endpoint is reached.

DISADVANTAGES OF NALOXONE:

Recurrence of respiratory depression in case of opioids with large volume of distribution due to mobilisation of opioids from peripheral storage sites into central compartments may occur. It has also been found to be associated with tachycardia, Hypertension and increase in the central symphathetic activity. In extreme cases, neurogenic pulmonary edema can occur.

OTHER OPIOID ANTAGONISTS:

- Naltrexone
- Nalmefene

DRUG INTERACTIONS OF OPIOIDS:

Opioids are most commonly used with intravenous induction agents, muscle relaxants and inhalational agents.

1. Sedatives-Hypnotics

a) Opioids when used with propofol decreases the mean arterial pressure, heart rate and systemic vascular resistance.

b) Opioids has synergistic interaction with benzodiazepines causing significant cardiovascular depression leading to hypotension and bradycardia. The incidence of hypoventilation and hypoxemia are increased many fold.

c) With barbiturates, opioids produce significant hypotension due to venodilation and reduced preload.

d) With ketamine, there is no significant loss of cardiovascular stability.

2. Muscle relaxants

a) Vagolytic action of pancuronium attenuates opioid induced bradycardia and supports blood pressure.

b) Vecuronium when used with opioids potentiate decrease in heart rate and cardiac index.

3. Inhalational anaesthetic agents

a) Opioids when combined with volatile agents provides good amnesia and promotes immobility. It also demonstrates well preserved cardiac output and mean arterial pressure.

b) With nitrous oxide, opioids produce decrease in cardiac output, heart rate and arterial pressure.

PROPOFOL

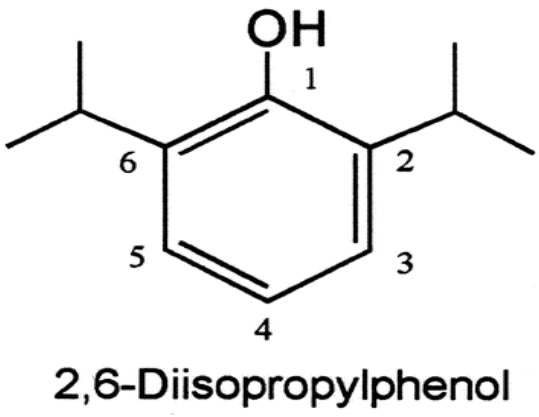


Figure 6:CHEMICAL STRUCTURE OF PROPOFOL

Propofol is the most commonly used sedative-hypnotic that reversibly depresses the central nervous system activity. Propofol is the 2,6 diisopropylphenol which is available in milky white emulsion in the concentration of 1 or 2%.It is water insoluble agent with the pH of 4.5-6.4 and pKa of 11.The aqueous solution of propofol contains 10% soyabean oil, 2.25% glycerol , 1.2% 0f purified egg phosphatide and sodium metabisulfite as the preservative.

Mixing up of propofol with any other drug is not at all recommended as it may form oil droplets thereby increasing the risk of pulmonary embolism. Lipid emulsions of propofol poses the risk of Pain on injection, Risk of infections. Pulmonary embolism and Hypertriglyceridemia.

MECHANISM OF ACTION:

The mechanism of action of Propofol is mediated mainly through the $GABA_A$ receptor and NMDA subtype of glutamate receptor to a minor extent. GABA is gamma amino butyric acid and is the principal inhibitory neurotransmitter of the human brain. GABA receptor are of two types, $GABA_A$ and $GABA_B$. Out of these two, $GABA_A$ receptor is made of 5 subunits called alpha, beta, gamma, delta and sigma made of proteins. They form a complex to produce a chloride ion channel when they are inserted into the cell membrane. Activation of $GABA_A$ receptor leads to increased chloride conductance and thus hyperpolarising the cell membrane leading to reduced excitability of the neurons. Immobility during propofol induction is not caused by spinal cord depression as propofol do not supress the spinal motor neuron excitability.

PHARMACOKINETICS:

Onset	:	15-45s
Awakening	:	5-10 minutes
Context sensitive half life	:	<40 minutes
Elimination half time	:	0.5-1.5 hours

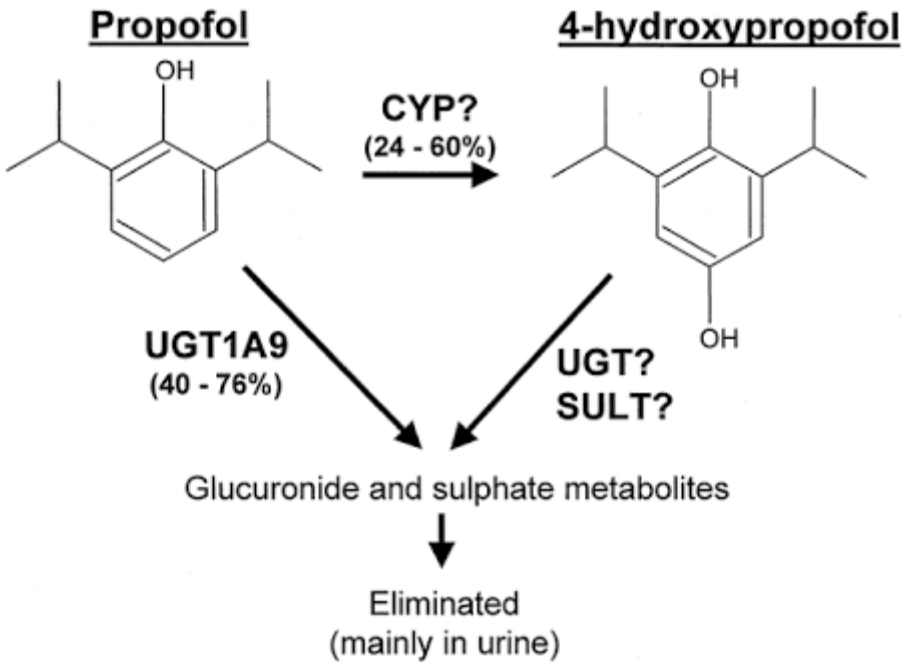


Figure 7: PHARMACOKINETICS OF PROPOFOL

Tissue uptake especially by the lungs and hepatic oxidative metabolism are important in elimination of propofol from the plasma. In liver, with cytochrome P450, propofol undergoes hydroxylation to form 4 hydroxy propofol which has only one third of the hypnotic activity like that of propofol. Propofol undergoes

rapid and extensive metabolism in the liver forming water soluble and inactive glucuronic acid and sulphate metabolites which are excreted in the urine.

PHARMACODYNAMICS:

CENTRAL NERVOUS SYSTEM

Unconsciousness occurs with induction doses while subhypnotic doses produce amnesia and sedation[17].Propofol does not possess any analgesic properties.

Propofol produces decrease in cerebral blood flow and oxygen consumption.Occasional involuntary movements may sometimes occur following induction with propofol. Propofol has also been used in control of refractory seizures.It also possess antiemetic action[18].The greatest advantage of propofol over other agents is rapid and complete awakening after induction.

CARDIOVASCULAR SYSTEM[19]

Propofol produces dose dependent fall in blood pressure due to

1. Venodilation and peripheral pooling.
2. Fall in systemic vascular resistance
3. Decreased cardiac contractility.

Reflex tachycardia does not occur due to attenuation of baroreceptor reflex mechanism. Cardiac output decreases by 20%.Myocardial oxygen demand supply ratio is well preserved when dangerous fall in blood pressure is avoided. Fall in blood pressure is more marked in Hypertensive patients, Elderly, hypovolemic patients and when the drug is injected rapidly.

Propofol suppresses the sympathetic system activity more when compared to the parasympathetic system thereby leading to predominant parasympathetic activity. Propofol produces profound bradycardia and sometimes asystole when administered to young healthy individuals and the risk is estimated to be 1.4 in 1,00,000. Propofol despite pretreatment with anticholinergics, it increases the incidence of oculocardiac reflexes in paediatric strabismus surgery. Decreased heart rate responses to IV atropine following propofol administration has been noted due to suppression of sympathetic nervous system activity. Hence propofol induced bradycardia not responding to anticholinergic agents should be treated with direct beta agonists like epinephrine.

RESPIRATORY SYSTEM

Propofol is a potent respiratory depressant and it causes apnea[20] in 25-35% of the patients following induction. Apnoea may get prolonged for more than 30 seconds. Incidence and duration of apnoea is greater with propofol than with other intravenous induction agents and it is more when used along with opioids. Ventilatory Response to Hypercarbia and Hypoxia[21] are all depressed with propofol due to its action on central chemoreceptors. Propofol attenuates upper airway reflexes better than other IV induction agents thus facilitating insertion of LMA. Propofol causes bronchodilatation by direct smooth muscle relaxation. Maintenance infusion of propofol decreases the rate and depth of respiration and

so propofol infusions should be cautiously used in patients with respiratory compromise.

INTRA OCULAR PRESSURE[22]

Propofol found to decrease the intraocular pressure following induction of general anaesthesia and also during tracheal intubation. This property is well utilized in patients with ocular hypertension undergoing laparoscopic surgeries where the risk is further increased by head down position. Hence, Total IV anaesthesia with propofol can lower intraocular pressures in laparoscopic surgeries.

DOSAGES:

Induction	:	2-2.5 mg/kg IV
Maintenance	:	100-300 mcg/kg/min IV
Sedation	:	25-100 mcg/kg/min IV

CLINICAL USES:

Propofol is used for

-Induction of anaesthesia

-Maintenance of general anaesthesia

-Sedation following regional anaesthesia

-Monitored anaesthesia care

-In subhypnotic doses, propofol is used in the treatment of chemotherapy induced vomiting and Refractory postoperative nausea and vomiting as a single IV dose of 10 mg followed by 10mcg/kg/min. Pruritus associated with neuraxial opioids can be treated with Single bolus dose of Propofol 10mg IV.

Anticonvulsant activity

Propofol in doses > 1 mg/kg IV found to decrease the duration of seizure by 35-45% in patients undergoing modified ECT. Propofol has potent neuroprotective effect[23] which is strongly related to its phenol ring structure as it resembles vitamin E , a potent antioxidant.

SIDE EFFECTS AND COMPLICATIONS:

1. Propofol causes pain at injection site and this can be reduced by using large vein and by adding Lignocaine 0.5mg/kg.
2. Proconvulsant activity

   Incidence of Myoclonus and propofol induced seizures following induction and emergence from general anaesthesia has been reported.

3. When compared to other IV induction agents, propofol has

   -Greater incidence and duration of apnoea.

   -Greater incidence of hypotension

   -Risk of aspiration is high due to attenuation of upper airway reflexes.

4. Propofol emulsion supports bacterial growth hence unused propofol should be discarded after 6 hours to prevent bacterial contamination.

5. Propofol infusion syndrome:

Propofol infusion for prolonged period have been found to be associated with propofol infusion syndrome due to hepato cellular injury. It is characterised by the presence of lactic acidosis, bradyarrythmias and rhabdomyolysis.

6. Propofol infusions may sometimes result in green coloured urine due to the presence of phenols in urine.

DEXMEDETOMIDINE

Dexmedetomidine is a selective alpha2 agonist approved for use in 1999. It has approximately 7 to 8 times the alpha2 selectivity than that of clonidine. It is an imidazole compound, the dextroisomer of medetomidine that demonstrates selective alpha2 agonistic actions . Alpha2 agonists produces sedation, anxiolysis, sympatholysis, and possess some analgesic properties.

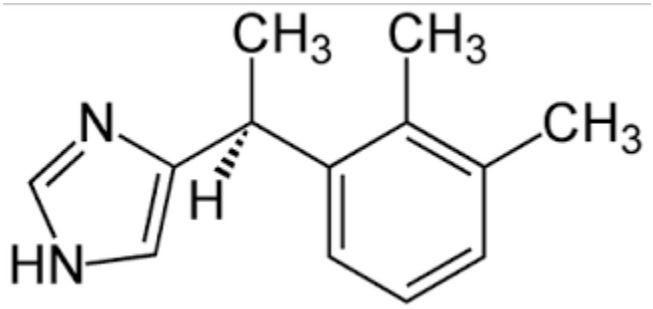


Figure 8: CHEMICAL STRUCTURE OF DEXMEDETOMIDINE

PHARMACODYNAMICS:

Dexmedetomidine is a relatively selective alpha 2 adrenoceptor agonist with the ratio of selectivity being 1600:1(alpha2:alpha1). It decreases the activity of noradrenergic neurons present in the locus ceruleus of the brain stem and induces sedation.

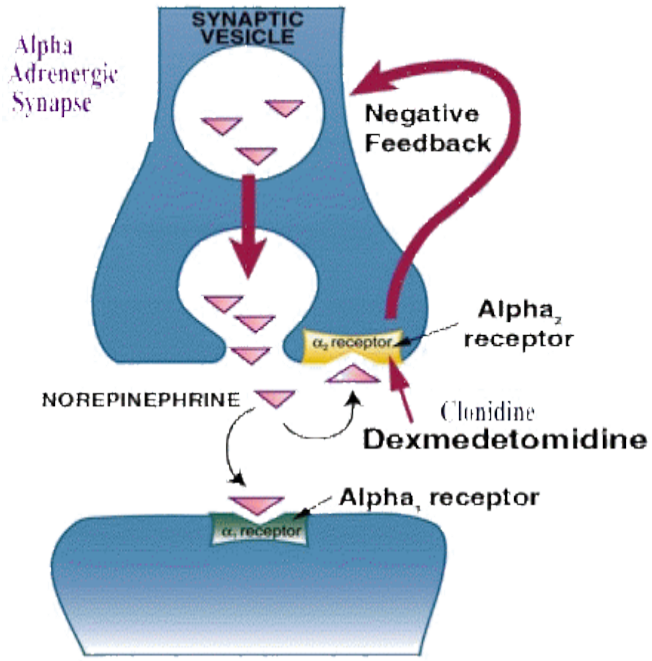


Figure 9: MECHANISM OF ACTION OF DEXMEDETOMIDINE

The clinical effects of Alpha2-AR agonists are produced after binding to three types of G-Protein-coupled 2-AR, (a2A, a2B, and a2C) each of which have the different physiological and pharmacological activities. Activated G proteins decreases cAMP formation leading to potassium efflux and hyperpolarisation of the cell membranes. Stimulation of a2 receptors also suppresses calcium entry into the nerve terminal leading to inhibitory effect on secretion of neurotransmitters. These subtypes of receptors are found in the central, peripheral, and autonomic nervous systems, and also in the vital organs of the body and blood vessels[24].

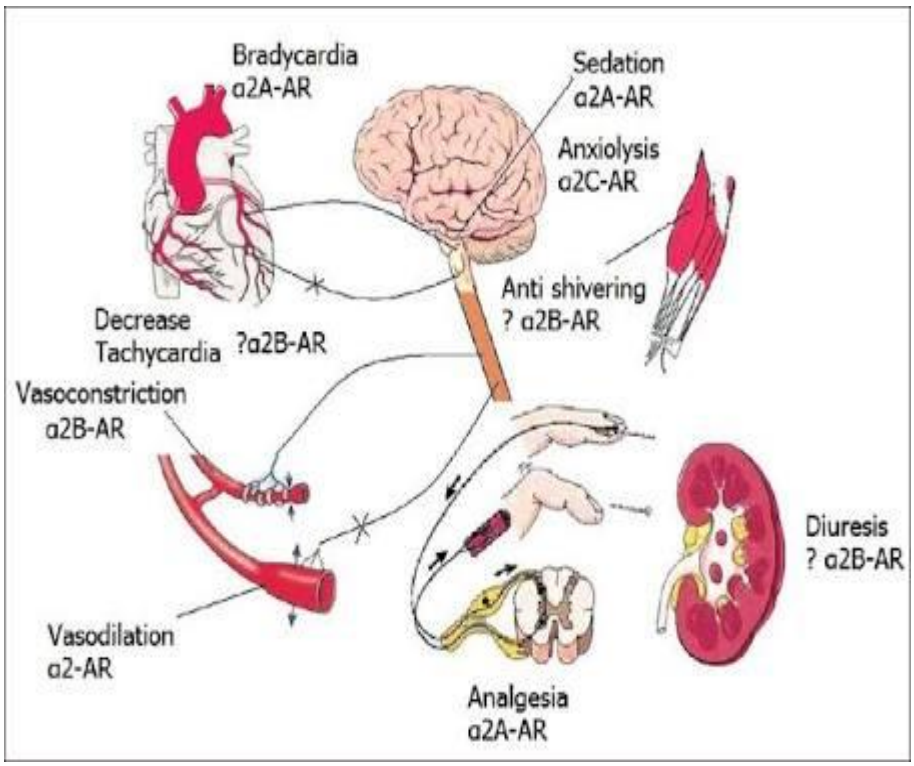
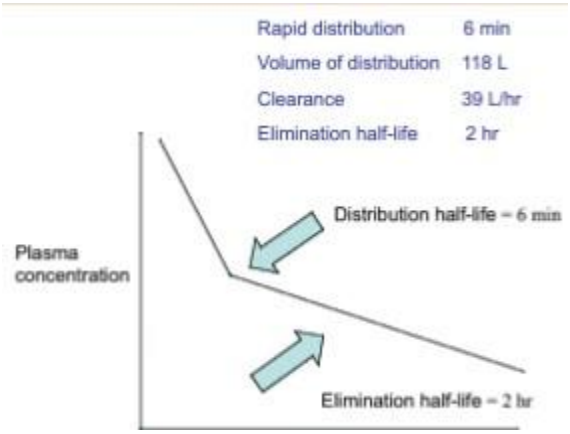


Figure 10:PHARMACODYNAMICS OF DEXMEDETOMIDINE

Sedative actions of dexmedetomidine are mediated by the post-synaptic activation of alpha 2-adrenoceptors at locus ceruleus of the brain stem. Analgesic actions are due to Activation of presynaptic alpha2 receptors present in the substantia gelatinosa of dorsal horn of the spinal cord. Post synaptic activation of alpha 2 receptor in the central nervous system leads to decrease in heart rate and vasodilatation. Dexmedetomidinehas also being tried as an antishivering agent[25] and diuretic. Following slow intravenous infusions in the low and medium doses (10-300 mcg/kg), Dexmedetomidine shows alpha2 selectivity. Both alpha 1 and alpha 2 activities have been observed after intravenous infusion of higher doses of >1000mcg/kg or with rapid intravenous injections. Dexmedetomidine also shows

very low affinity for beta adrenergic, muscuranic, dopaminergic and serotonergic receptors.

PHARMACOKINETICS



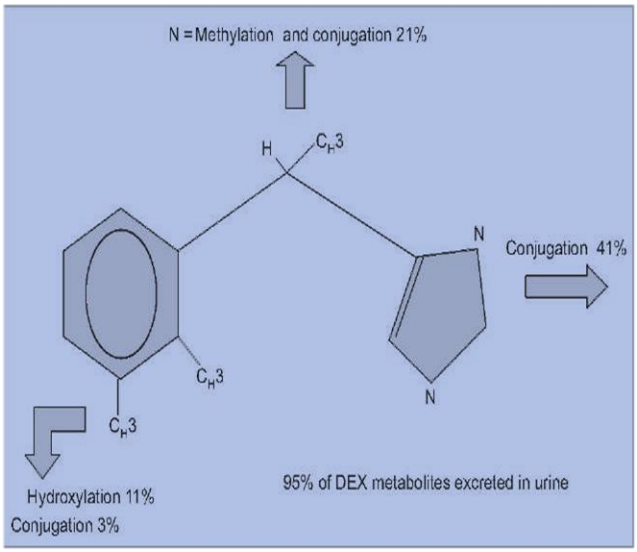


Figure 11: PHARMACOKINETICS OF DEXMEDETOMIDINE

Dexmedetomidine after intravenous administration, it shows rapid distribution phase with 6 minutes of distribution half life.The terminal elimination half life ($t^1/_2$) of Dexmedetomidine is about two hours. Dexmedetomidine, at the

dose between 0.2 - 0.7 mcg/kg/hr intravenous infusions shows a linear pharmacokinetics for upto 24 h. The volume of distribution of Dexmedetomidine is about 118L and it is 94% protein bound.

Dexmedetomidine has very poor oral bioavailability as it has extensive first pass metabolism. But still the bioavailability is high about 84%, after sublingual and intranasal administration. Hence, it can be used for paediatric sedation and premedication via sublingual and intranasal preparations. It undergoes glucuronidisation in the liver and only very little of dexmedetomidine is excreted unchanged in urine[26]. Dexmedetomidine also undergoes cytochrome P450 mediated metabolism in the liver to a minor extent.

In Patients with impaired hepatic and renal functions, clearance is much lower than in normal individuals and they need reduction in dosage. Age does not alter the pharmacokinetics of dexmedetomidine.

Table 2: DOSAGES AND ROUTES OF ADMINISTRATION

ROUTE	DOSAGES
INTRAVENOUS	*Loading dose :* 1 mcg/kg IV over 10 minutes. *Maintenance infusion:* 0.2- 0.7mcg/kg/hr.
INTRAMUSCULAR	Dose : 2.5 mcg/kg im. Intramuscular route can be used for premedication.
SPINAL	0.1-0.2 mcg/kg can be used intrathecally.
EPIDURAL	1-2 mcg/kg of dexmedetomidine can be used during epidural anaesthesia.
PERIPHERAL NERVE BLOCK	Inj.Dexmeditomidine 1mcg/kg can be used as an adjuvant in peripheral nerve blocks.
BUCCAL/ INTRANASAL	1-2mcg/kg of Inj.Dexmeditomidine can be used for paediatric premedication

CLINICAL USES:

1. PREMEDICATION:

Dexmedetomidine can be used in premedication for its sympatholytic property because it provides sedation, Anxiolysis , Analgesia along with hemodynamic stability. Dosage of Dexmedetomidine for Premedication is

i. 0.3- 0.6mg/kg i.v. or

ii. 2.5 mg/kg i.m given 15 min before surgery.

iii. 1-2 mcg/kg by intranasal or buccal route in the paediatric populations.

2. INTENSIVE CARE UNIT SEDATION:

Dexmedetomidine can be used in intensive care unit for sedation, in intubated and mechanically ventilated patients as arousal is maintained inspite of deep levels of sedation . Dexmedetomidine is now used in the treatment of ICU acquired delirium. Requirement of opioids was decreased by more than 50%with the use of dexmedetomidine. It also causes minimal respiratory depression. Dexmedetomidine can be used for weaning of the patient in ICU as it causes conscious sedation which is superior to benzodiazepines. Thus it shortens the period for extubation as well as the duration of ICU stay[27]. Only disadvantage is dexmedetomidine could not be used in patients with cardiac diseases and in patients with hemodynamic instability.

3. PROCEDURAL SEDATION:

Dexmedetomidine can be used successfully for sedation during minor surgical procedures and other minor interventional procedures. It can be safely used during

- Transesophageal echocardiography (TEE)[28] ,
- Colonoscopy ,

- Awake carotid end arterectomy ,
- Shockwave lithotripsy ,
- Vitreoretinal surgery ,
- Paediatric patients undergoing tonsillectomy.

The dosage of dexmedetomidine used for sedation during various procedures is about 1 mcg/ kg IV bolus , followed by an infusion of 0.2 mcg/kg/hr IV. The onset of action occurs within 5 minutes while the peak effect of dexmedetomidine occurs within 15 minutes of injection.

4. AS AN ADJUVANT IN LOCAL AND REGIONAL TECHNIQUES:

Dexmedetomidine is the highly lipophilic drug, facilitating rapid absorption of the drug into the cerebral fluid and binding of the drug to alpha2-AR of spinal cord producing analgesia. The duration of sensory and motor blockade gets prolonged if dexmedetomidine is used along with the local anaesthetics during epidural , caudal , or spinal anaesthesia. The central neuraxial and peripheral neural blockade induced by local anaesthetics is enhanced with the use of dexmedetomidine as an additive and it can also be used as an adjuvant in intravenous regional anaesthesia .

Dexmedetomidine added as adjuvant to local anaesthetics in peripheral nerve blocks decreases the time of onset and it prolongs the total duration of the blockade, thereby extending the period of postoperative analgesia[29] for the patient.

5. INTRAARTICULAR USE:

Dexmedetomidine can be used intraarticularly in patients undergoing arthroscopic surgeries and is found to provide good post operative pain relief[30] for the patients.

6. CONTROLLED HYPOTENSION:

Dexmedetomidine can be used as an effective and safe agent, that can produce controlled hypotension through its sympatholytic actions. Easy administration of the drug along with its predictability with other anaesthetic drugs and its ability to maintain adequate perfusion to the vital organs makes dexmedetomidine, an ideal agent for producing hypotensive anaesthesia[31].

7. ATTENUATION OF RESPONSES TO TRACHEAL INTUBATION AND EXTUBATION:

Attenuation of hemodynamic stress responses , both for intubation and extubation can be very well achieved by dexmedetomidine as it possess sympatholytic properties[32]. For attenuation of stress responses, dexmedetomidine can be used at the dose of 0.3- 0.6 mg/kg IV bolus given fifteen minutes prior to intubation or extubation. Unlike other anaesthetic agents, dexmedetomidine produces minimal respiratory depression and hence dexmedetomidine infusion can be continued till extubation is over for attenuating extubation resposes in high risk cases.

8. ANAESTHETIC SPARING EFFECT:

Intraoperative infusion of Dexmedetomidine at the maintenance dose of 0.5 mcg/kg/hr was found to reduce the requirement of other anaesthetic agents used during intraoperative period.

9. CARDIAC SURGERY:

Dexmedetomidine blunts the hemodynamic stress responses to endotracheal intubation,and it also reduces the incidence of myocardial ischemia[33] and injury during high risk cardiac surgeries.

Dexmedetomidine reduces the

-pulmonary vascular resistance,

-pulmonary artery pressure, and

-pulmonary capillary wedge pressures .Hence it can be used in patients with pulmonary hypertension planned for mitral valve repair or replacement. Dexmedetomidine due to its ‘cardiac stabilising effect’, it decreases the incidence of supraventricular arrhythmias during cardiac surgeries.

10. NEUROSURGERY:

Dexmedetomidine provides ‘cerebral hemodynamic stability’. Dexmedetomidine by attenuating hemodynamic responses to intubation and extubation, it prevents increase in intracranial pressure in neurosurgeries during the periods of intubation, extubation and insertion of head pin. Dexmedetomidine is now widely used in awake craniotomies for

a.) Resection of tumours or epileptic foci and

b.) Implantation of deep brain stimulators for Parkinson's disease .

11. IN OBESE PATIENTS AND BARIATRIC SURGERY:

Dexmedetomidine, as it causes very minimal respiratory depression,it can be used in sedating morbidly obese patients, thereby avoiding respiratory depression caused by the narcotic agents[34]. Dexmedetomidine is also useful as an anaesthetic adjuvant in patients undergoing Bariatric surgery and patients of obstructive sleep apnoea.

12. USE IN MRI AND CT SCAN:

Dexmedetomidine , 3mcg/kg IV bolus over ten minutes with maintenance infusion of 1 mcg/kg/hour can be used for sedation of paediatric population undergoing CT scan and MRI.

13. AWAKE INTUBATION:

Dexmedetomidine can be used for providing sedation and anxiolysis during awake fibre optic intubation as it causes very minimal respiratory depression.

14.POSTOPERATIVE ANALGESIA:

Intraoperative Dexmedetomidine also provides postoperative analgesia thereby decreasing the analgesic requirements in the immediate postoperative period.

REVIEW OF LITERATURE

1. Ali Asghan et al[36] conducted a study on 50 children aged 3-8 years undergoing extracorporeal shock wave lithotripsy to compare the efficacy of dexmedetomidine versus fentanyl as an adjuvant to propofol in laryngeal mask airway insertion. Patients received 0.7 mcg/kg loading dose over 10 minutes which is followed by 0.3 mcg/kg maintenance infusion of Dexmedetomidine and Fentanyl in Dexmedetomidine/propofol and Fentanyl/propofol group respectively. All the patients received propofol infusion to maintain the BIS value between 40-60 during the surgery and induction and maintenance dose required in both the groups were noted. It was found that propofol requirement was significantly lower in propofol dexmedetomidine group than propofol fentanyl group during induction and maintenance of anaesthesia.

2. Shaikh et al[37] compared dexmedetomidine propofol (group D)with fentanyl propofol (group F) for insertion of laryngeal mask airway. Sample size was 80 with 40 patients in each group. Group F received 1mcg/kg of fentanyl over 2 minutes and group D received 1 mcg/kg of Inj.Dexmedetomidine over 2 minutes. After 30 seconds, patients were induced with Inj. propofol 2 mg/kg IV and LMA insertion was made after 90 seconds of propofol injection. Insertion conditions were studied using Jaw relaxation grading and cough grading. Other events like duration of apnoea, lacrimation were

also noted.37 (92.5%) patients of group D and 35 (87.5%) patients of group F had LMA insertion score of <2 and 5 (12.5%) patients of group F had score >2. Adverse events to insertion of LMA and hemodynamic variables were comparable in both the groups. Number of patients developing apnoea was larger and apnoea times were longer in group F compared to group D. When compared to group F, group D showed an increased respiratory rate. They conclude that dexmedetomidine is a comparable alternative to fentanyl when used as a coinduction agent with propofol for insertion of LMA. Both the drugs provide stable hemodynamics but, dexmedetomidine is superior to fentanyl in preserving respiration.

3. Soumya jayaram et al[38] compared the adequacy of anaesthesia provided by propofol 2mg/kg in combination either with dexmedetomidine 1 mcg/kg (group D) or fentanyl 1 mcg/kg (group F) for insertion of LMA.60 patients were included in the study with 30 patients in each group. Dexmedetomidine and fentanyl were given at the dose of 1mcg/kg in 10 ml of normal saline over 2 minutes in group D and group F respectively. Following 30 seconds of administration of coinduction agents Inj. propofol 2mg/kg was given.90 seconds after propofol injection, first attempt of LMA insertion was made and insertion conditions were assessed with Jaw grading, Cough grading, Movements during insertion and number of attempts. The insertion conditions were similar in both the groups. The

respiratory depression in Group F was greater than that in group D when compared in terms of number of patients developing apnoea (67% Vs 40%; $p<0.01$). There was a statistically significant reduction from the base line blood pressures measured since the administration of study drug namely, MAP, SBP and DBP in group D. The combination of propofol and dexmedetomidine group caused less respiratory depression and more stable haemodynamics compared to propofol and fentanyl group.

4. Surabhi et al[39] compared the efficacy of dexmedetomidine-propofol and fentanyl-propofol for LMA insertion and found that Dexmedetomidine at the dose of 1 mcg/kg over ten minutes infusion gives better insertion conditions for the LMA compared to fentanyl 1 mcg/kg when used with propofol at the dose of 2.5 mg/kg . Jaw relaxation grading was acceptable in all the patients (100%) in group D whereas in group F 28 patients(93.33%) had acceptable grade of jaw relaxation. Cough grading in group D was acceptable in all the patients while in group F 29 patients had acceptable cough grading. There was no significant difference in the number of attempts at LMA insertion between two groups(Number of second attempts: Group D-1,Group F-5). In fentanyl group there was a significant rise in SBP and HR in the Post LMA phase which was not seen in dexmedetomidine group. It was concluded that Dexmedetomidine gives

better insertion conditions and better attenuation of pressor responses to LMA insertion compared to the fentanyl group.

5. Uzumcugil et al[40] compared the efficacy of dexmeditomidine-propofol and fentanyl-propofol for LMA insertions.52 patients undergoing minor urological procedures were randomly divided into two groups, group F and group D. After preoxygenation and premedication, Patients in group F received 1mcg/kg of fentanyl in 10 ml of normal saline over 2 minutes and patients in group D received 1mcg/kg of dexmedetomidine in 10 ml of normal saline over 2 minutes.3 minutes after the administration of study drug patients were induced with propofol 1.5mg/kg.90 seconds after propofol injection, LMA was inserted and insertion conditions were assessed with jaw relaxation grading, cough grading, lacrimation. Other events like breath holding, apnoea time were also noted. It was concluded that dexmedetomidine is the better co induction agent than that of fentanyl in terms of success of LMA insertion and it preserves respiration more than that of fentanyl.

6. Divatia et al[41] compared induction of anaesthesia with intravenous propofol and inhalational anaesthetic agent sevoflurane for insertion of LMA in fifty female patients of age 30-70.Intravenous induction was made with IV propofol of dose 2.45 mg/kg and Inhalational induction was made with

sevoflurane 8% in Nitrous oxide 50% with oxygen at the flow rate of 8 L/min. After loss of eye lash reflexes Inj. Fentanyl 2 mcg/kg was given in both the groups and insertion of LMA was attempted and insertion conditions were assessed in both the groups. Insertion conditions were assessed with Jaw opening, Ease of insertion and Patients response to LMA insertion like coughing, gagging, laryngospasm and patient movements. Fibreoptic bronchoscope score for the position of LMA was done. Excellent conditions were obtained in significantly greater number of patients in Propofol Group with rapid induction time than that of sevoflurane group.

7. Dhamotharan et al[42] did a comparative evaluation of fentanyl and midazolam with propofol induction for insertion of LMA.90 patients were divided into three groups, fentanyl with propofol group(group I), midazolam with propofol group(groupII) and propofol group(groupIII). After premedication and preoxygenation, Group I received Inj. fentanyl 2mcg/kg IV, Group II received Inj. midazolam 0.05mg/kg IV, and Group III received Inj. normal saline IV respectively. Two minutes later, patients were induced with Inj. Propofol 2.5mg/kg IV and LMA insertion was made after 90 seconds of induction and insertion conditions were assessed.LMA insertion conditions were assessed using six variables like jaw opening, ease of insertion, gagging , coughing, limb or head movements,

laryngospasm or airway obstruction on a 3-point scale.LMA insertion was easy in 24 patients in Group I, 24 patients in Group II, and in 10 patients in Group III. Statistically significant variations were found between Groups I and III and between Groups II and III. There was no statistical variations between Groups I and II. It was concluded that both fentanyl (2mcg/kg) and midazolam (0.05mg/kg) are comparable alternatives and acts as an ideal adjuvant for propofol induction during LMA insertions.

8. Goyagi et al[43] conducted a study in 41 healthy patients. Patients were randomly allocated into 2 groups study group receiving Inj. Fentanyl 2 mcg/kg IV or control group receiving normal saline in equal volumes. Thirty seconds after study drug administration predetermined dose of Inj 1% propofol was administered at the rate of 100mg/minute. The dose of propofol was determined by the response of preceding patient in that group to the lower or higher doses, using the up or down method. The first patient of each group received Propofol at the dose of 2.5mg/kg with the step size of 0.25mg/kg. It was found that Pre administration of fentanyl 2mcg/kg decreases the propofol requirement for the insertion of LMA as the ED_{50} and ED_{95} of Propofol were less in fentanyl group(0.82,1.17mg/kg) than that of control group(2.39,2.62mg/kg).

9. Kwak et al[44] conducted a study on 22 patients undergoing minor orthopaedic or gynaecological surgeries and found that the single dose of dexmedetomidine for successful insertion of LMA in 50% of patients was 0.55 mcg/kg when used along with propofol induction at the dose of 2mg/kg.

10. Nirmala et al[45] conducted a comparative study for the ease of insertion of LMA between propofol and thiopentone. This study includes 100 patients with 50 patients in each group (Group A-Thiopentone with fentanyl,Group B-Propofol). After preoxygenation and premedication patients in group A received , fentanyl 2 mcg/kg and Inj.Thiopentone 5mg/kg while patients in group B received Inj.Propofol 2.5 mg/kg. After the loss of eye lash reflexes,LMA insertion was made and insertion conditions were assessed with jaw relaxation, ease of insertion, coughing, gagging, limb movements, laryngospasm. Ease of insertion of LMA was significantly greater in patients who were induced with propofol compared to induction with thiopentone sodium and fentanyl.

11. Ranju singh et al[46] compared ketamine propofol and fentanyl propofol for the insertion of laryngeal mask airway in children and found that fentanyl 2mcg/kg along with propofol 3.5mg/kg provides good insertion condition for LMA than that of ketamine 0.5mg/kg combined with propofol 3.5mg/kg.

12. Qattan et al[47] compared remifentanil (0.5mcg/kg) and alfentanil (5mcg/kg) and concluded that both the drugs provide similar insertion conditions for LMA when used along with propofol 2.5mg/kg as an induction agent.

13. Goel et al[48] studied efficacy of ketamine 0.5mg/kg and midazolam 0.05mg/kg as adjuvants to propofol (2.5mg/kg) induction for LMA insertion in paediatric cases and concluded that both the drugs provide good insertion conditions and stable hemodynamics that is comparable but in the presence of delayed recovery in both the groups.

14. Gupta A et al[49] evaluated ketamine (0.5mg/kg)- propofol (2.5mg/kg), Fentanyl (1mcg/kg)-propofol (2.5mg/kg) and Butorphanol (20mcg/kg)- propofol (2.5mg/kg) and concluded that butorphanol in combination with propofol provides optimal insertion conditions for LMA along with providing stable hemodynamics than that of ketamine and fentanyl.

15. Akanksha Dutt et al[50] studied insertion conditions for classic LMA with Propofol (2.5mg/kg) induction along with Fentanyl in two doses 1mcg/kg and 2mcg/kg and concluded that both the doses of fentanyl provides good insertion conditions for LMA but the hemodynamic stability was found to be more with low dose Fentanyl (1mcg/kg) group.

MATERIALS AND METHODS

This is a Prospective double blinded randomised control study conducted in the Mahatma Gandhi memorial hospital, Trichy during the period of April 2015 – April 2016.The total sample size was 60 which included two groups

Fp - Propofol with fentanyl (30)

Dp - Propofol with Dexmedetomidine (30)

Institutional ethical committee approval was obtained prior conducting the study.

INCLUSION CRITERIA:

- ASA I-II
- Age 18-60 years.
- Weight 30-70 kg.
- MPC I-II

Patients Undergoing elective superficial breast surgeries like Excision of fibro adenoma and websters operation performed for gynaecomastia were included in the study.

EXCLUSION CRITERIA:

- Patients of ASA >II , MPC > II
- Patients with Asthma, Respiratory or Oropharyngeal tract pathology.
- Patients on Antihypertensive drugs.
- Patients with risk of aspirations.
- Patients with known drug allergy.
- Patients refusal to study.

METHODOLOGY

Pre anaesthetic evaluation was done and informed consent was obtained one day prior to the surgery. Sixty Patients satisfying inclusion criteria were randomly allocated into two groups by computerised randomisation table. All the LMA insertions were made with classic LMA with standard insertion technique. Size of the LMA to be used in each patient was determined according to their weight.

On the day of surgery, after ten hours of fasting, patients were shifted to the operating room and connected to monitors. Baseline vitals of the patients like NIBP, Pulse rate and SPO2 were noted. All the patients were premedicated with Inj. Glycopyrrolate 0.2mg im, Inj. Ranitidine 50mg IV and Inj. Ondensetran 4 mg IV 30 minutes before surgery. After preoxygenation Group Fp received 2 microgram/kg of Inj . Fentanyl[43] in 100 ml of normal saline over 10 minutes and Group Dp received 1 microgram/kg of Inj. Dexmedetomidine[44] in 100 ml of NS over 10 minutes IV. The study drug was prepared by the anaesthesiologist who was not involved in the study and dispensed in an unlabelled manner. Following administration of study drugs, Inj. Propofol 2 mg/kg[38]IV was given to both the groups.90 seconds after propofol injection, the first attempt of LMA insertion was made by the anaesthesiologist who was blinded to the study and ease of insertion of LMA was assessed .

The ease of insertion of LMA was assessed with

1. Jaw relaxation
2. Coughing during LMA insertion
3. Number of attempts
4. Adequacy of ventilation.
5. Incidence of complications.

After insertion, cuff of the LMA was inflated with its respective cuff volume and outward movement of LMA was observed for proper placement. Proper placement of LMA was confirmed with the help of capnography, Auscultation of chest for bilateral air entry, adequacy of ventilation and absence of gastric insufflation. If the first attempt of LMA placement was failed in either of the groups, additional dose of Inj.Propofol 0.5mg/kg was given and second attempt of LMA insertion was made after 30 seconds. Jaw relaxation grade >2, Coughing grade >2 and adequacy of ventilation of grade 3 were considered as failure in LMA placement.

After successful placement of LMA and after confirming its proper placement, anaesthesia was instituted with oxygen nitrous oxide mixture along with sevoflurane. Muscle relaxation was maintained with non depolarising muscle relaxant, Inj. Vecuronium bromide 0.1mg/kg. At the end of the surgery, patients were reversed with Inj .Neostigmine 50mcg/kg along with Inj. Glycopyrrolate 10mcg/kg and LMA was removed. Hemodynamic parameters like systolic blood

pressure, diastolic blood pressure, heart rate and SpO2 were monitored through out the surgery. Fall in Heart rate and blood pressure more than 20% from the baseline value was considered bradycardia and hypotension respectively. Bradycardia and hypotension were treated with Inj. Atropine 0.6 mg IV and Inj. Ephedrine 6 mg IV respectively.

SCORING SYSTEM FOR JAW RELAXATION[38]

GRADE 1- Fully relaxed.

GRADE 2- Mild resistance

GRADE 3- Tight but opens.

GRADE 4- Closed.

GRADE 1 & 2 were acceptable for LMA insertions.

SCORING SYSTEM FOR COUGHING[38]

GRADE 1- No cough.

GRADE 2- One or Two coughs.

GRADE 3- Three or more coughs.

GRADE 4- Bucking or Movements.

GRADE 1 & 2 were acceptable for LMA insertions

ADEQUACY OF PLACEMENT

GRADE 1: Adequate ventilation without audible leak.

GRADE 2: Adequate ventilation with audible leak.

GRADE 3: Inadequate ventilation which mandates removal and reinsertion of LMA.

INCIDENCE OF COMPLICATIONS

1. Laryngospasm.
2. Bronchospasm.
3. Blood stain on LMA

The data collected[39] during the study includes,

-Demographic data like Age, Sex, Weight, Duration of surgery.

-Scoring system for Jaw relaxation and Coughing.

- Number of attempts of LMA insertion.

-Analysis of adequacy of placement of LMA insertion.

-Incidence of complications

-Pre and Post insertion hemodynamics.

-Incidence of hypotension and bradycardia.

-Ephedrine and atropine usage

STATISTICAL ANALYSIS

The observed data was analysed with SPSS software, version 21.0. The collected data were tabulated and expressed as mean, standard deviation, numbers and percentages. The comparison between the two groups was done by student t-test for parametric data and chi square test for Nonparametric data and the appropriate values were reported as 95% confidence interval. P value of less than 0.05 was considered statistically significant.

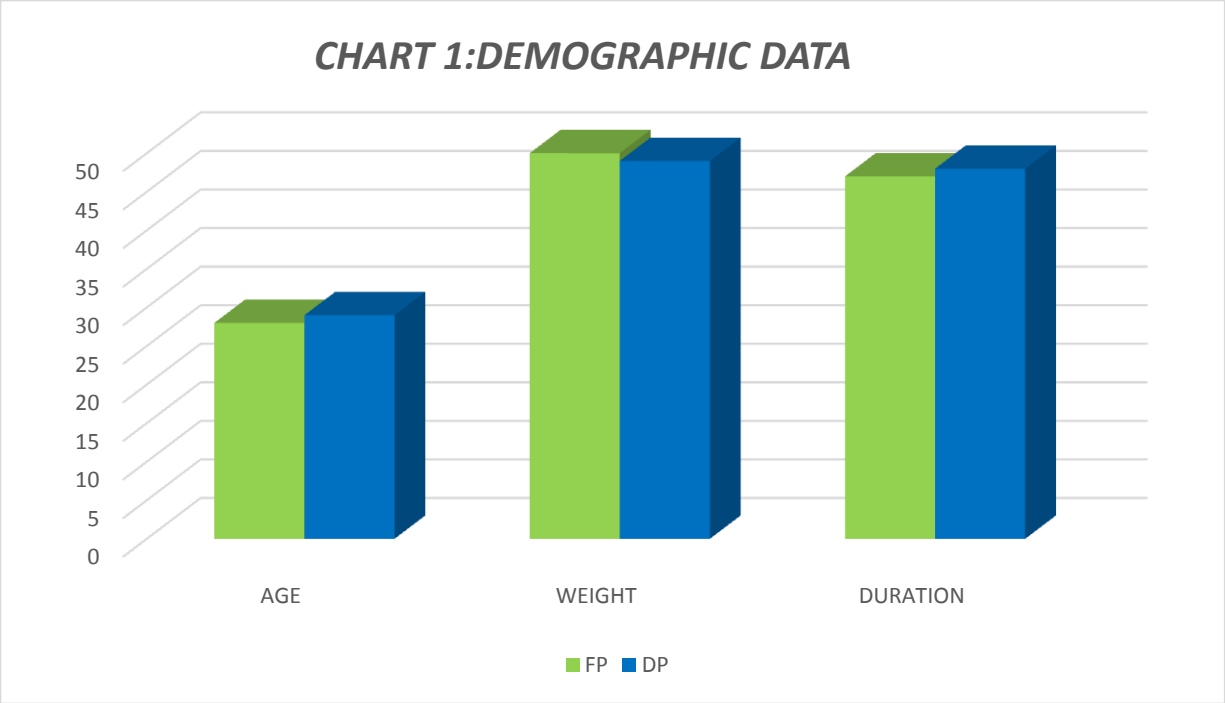
RESULTS AND OBSERVATIONS

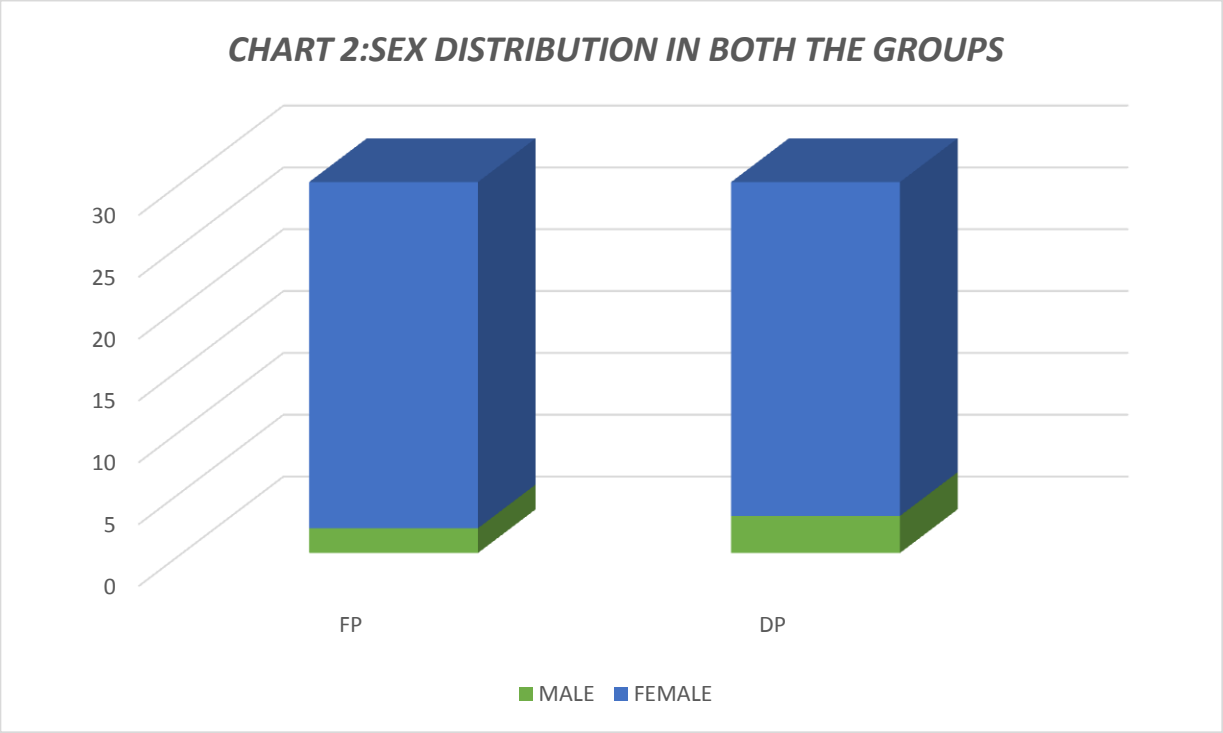
DEMOGRAPHIC DATA:

TABLE 3 : DEMOGRAPHIC DATA

VARIABLES	GROUP F_P MEAN ± 2SD	GROUP D_P MEAN ± 2SD	p-VALUE
AGE	27.63±4.71	26.90±5.16	0.568
WEIGHT	50.40±5.73	49.60±6.16	0.605
GENDER			
MALE	2 (6.7%)	3(10%)	X^2=0.218 Df=1 .640>0.05 Not Significant
FEMALE	28(93.3%)	27(90%)	
DURATION OF SURGERY	47.67±9.35	48.00±8.46	0.885

All the 60 patients included in the study belong to ASA category I with MPC grade I.





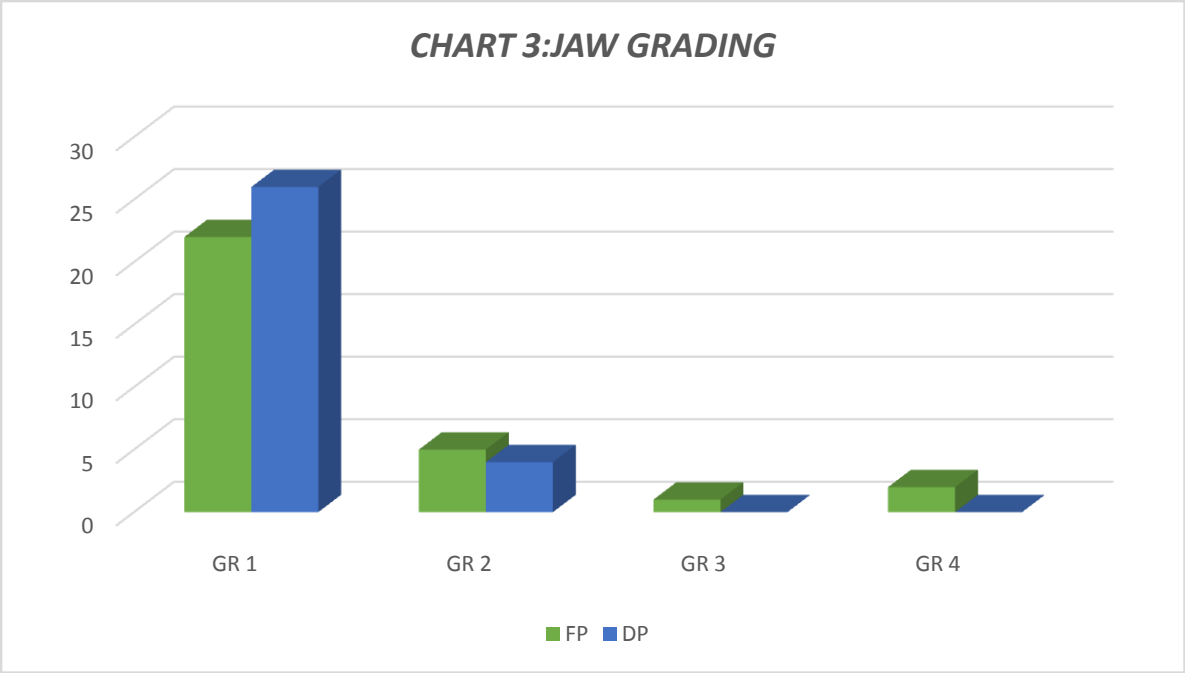
Demographic data like age, gender, weight, duration of surgery, ASA status and MPC status were all comparable in both the groups with p value > 0.05.

COMPARISON OF INSERTION CONDITIONS

JAW GRADING:

TABLE 4 : JAW GRADING 1

JAW GRADING	GROUP F_P (n)	GROUP D_P (n)
GRADE 1	22	26
GRADE 2	5	4
GRADE 3	1	0
GRADE 4	2	0



In group Fp, 22 patients showed jaw relaxation of grade 1 , 5 patients had grade 2 jaw relaxation , 1 patient had grade 3 jaw relaxation and 2 patients had grade 4 jaw relaxation. As grade 1 and 2 only were considered acceptable for LMA insertion, 3 patients in control group had jaw relaxation condition which was not optimal for insertion of LMA.

In group Dp, 26 patients had jaw relaxation grade 1 while the remaining 4 patients had grade 2 jaw relaxation. No patient in group Dp had jaw relaxation grade of 3 and 4which was considered unacceptable for LMA insertion.

Table 5: JAW GRADING 2

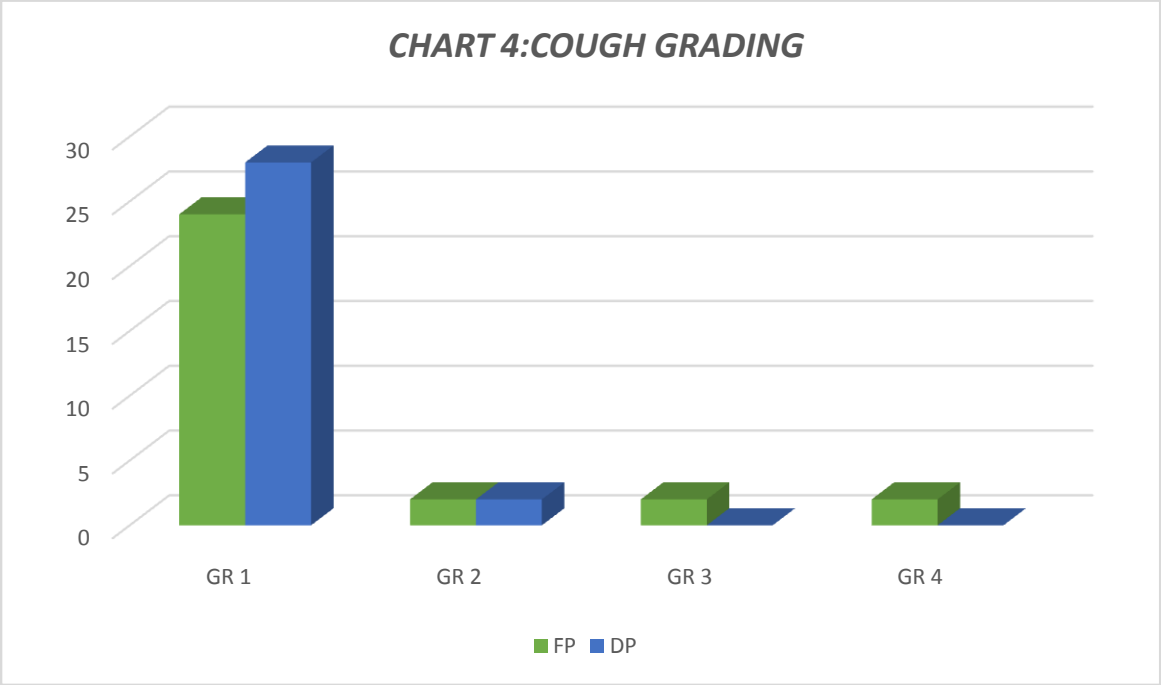
JAW GRADING	GROUP Fp n(%)	GROUP Dp n(%)	STATISTICAL INTERFERENCE
ACCEPTABLE	90%(27)	100%(30)	X^2=3.158 df=1 0.076>0.05
UNACCEPTABLE	10%(3)	0%(0)	

In the study group, all the patients(100%) had jaw relaxation which was optimal for LMA insertion while in the control group,90% of the patients had acceptable grade for jaw relaxation. No statistically significant difference was observed between two groups in terms of jaw grading as the p value is 0.076.

COUGH GRADING:

TABLE 6 : COUGH GRADING 1

COUGH GRADING	GROUP F_P (n)	GROUP D_P (n)
GRADE 1	24	28
GRADE 2	2	2
GRADE 3	2	0
GRADE 4	2	0



In group Fp, 24 patients had grade 1 cough and 2 patients had grade 2 cough. Grade 3 cough was seen in 2 patients and grade 4 cough was seen in 2 patients. So, totally 4 patients in group Fp had unacceptable grade of cough for LMA insertion.

In the group Dp, 28 patients had grade 1 cough grading while the remaining 2 patients had grade 2 cough. Thus all the patients in the group Dp had acceptable conditions for LMA insertion in terms of grading of cough.

Table 7: COUGH GRADING 2

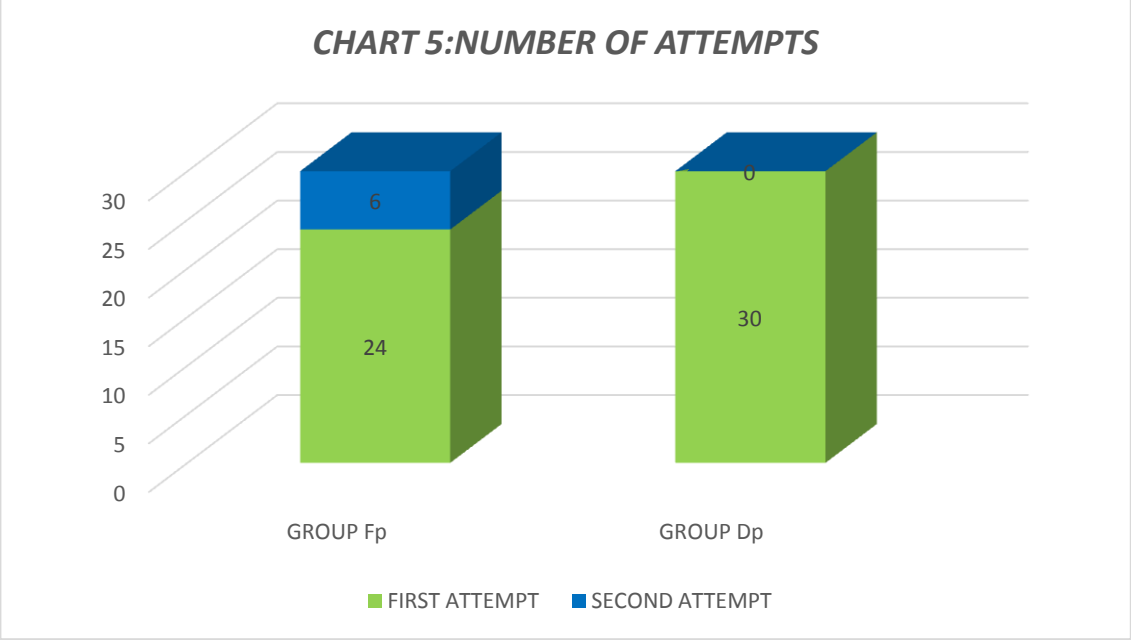
COUGH GRADING	**GROUP Fp n (%)**	**GROUP Dp n (%)**	**STATISTICAL SIGNIFICANCE**
ACCEPTABLE	86.7%(26)	100%(30)	X^2=4.286 df=1 ***0.038<0.05***
UNACCEPTABLE	13.3%(4)	0%(0)	

In group Fp , 86.7% of the patients had acceptable cough grade for LMA insertion compared to the group Dp where 100% of the patients had acceptable grading for cough with statistically significant p value of ***0.038***.

NUMBER OF ATTEMPTS:

TABLE 8 : NUMBER OF ATTEMPTS

NUMBER OF ATTEMPTS	GROUP F_P (n)	GROUP D_P (n)	STATISTICAL INTERFERENCE
ONE **TWO**	24 6	30 0	X^2=6.667 Df=1 ***.010<0.05*** ***Significant***



In group Fp, successful placement of LMA with optimal insertion conditions was achieved in 24 patients in the first attempt and in group Dp, all the 30 patients had optimal insertion conditions with successful placement of LMA in the first attempt itself.

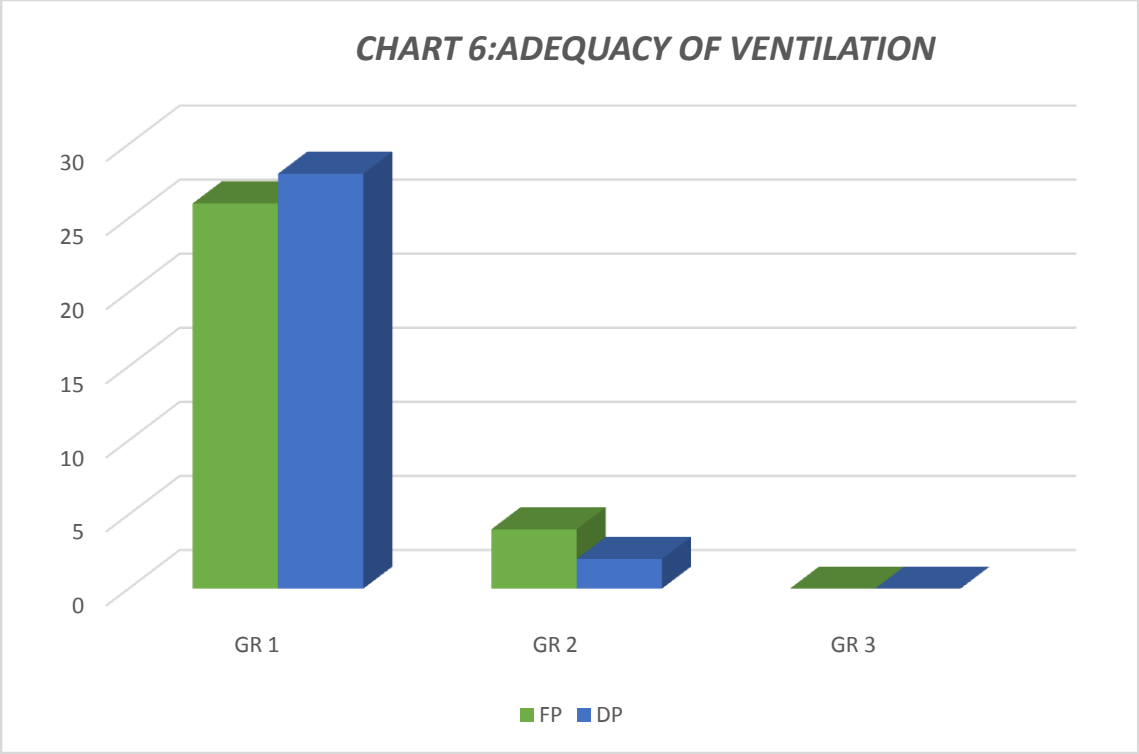
In group Fp, second attempt of LMA insertion was needed in 2 patients with jaw relaxation grade 4, 2 patients with grade 3 cough and 2 patients with grade 4 cough. So totally 6 patients received additional dose of propofol in group Fp after which the second attempt of LMA insertion was made and LMA was placed successfully.

In group Dp, all the patients had acceptable conditions for LMA insertion and all LMA insertions were made in the first attempt. Statistical significance was observed between the two groups in terms of number of attempts as the p value is ***0.01***(<0.05).

ADEQUACY OF VENTILATION:

TABLE 9 : ADEQUACY OF VENTILATION

ADEQUACY OF VENTILATION	GROUP $F_P(n)$	GROUP $D_P(n)$	STATISTICAL INTERFERENCE
GRADE 1	26	28	X^2=0.741 Df=1 .389>0.05 Not Significant
GRADE 2	4	2	
GRADE 3	0	0	



In the group Fp, 26 patients had grade 1 ventilation and 4 patients belong to grade 2 in terms of adequacy of ventilation. Both grade 1 and 2 are considered acceptable for insertion of LMA.

In the study group, 28 patients had grade 1 and the remaining 2 patient belongs to grade 2 in terms of adequacy of ventilation. In both the study and control group, all the patients had adequate ventilation following LMA insertion. There was no statistically significant difference observed between both the groups in terms of adequacy of ventilation as p value is > 0.05

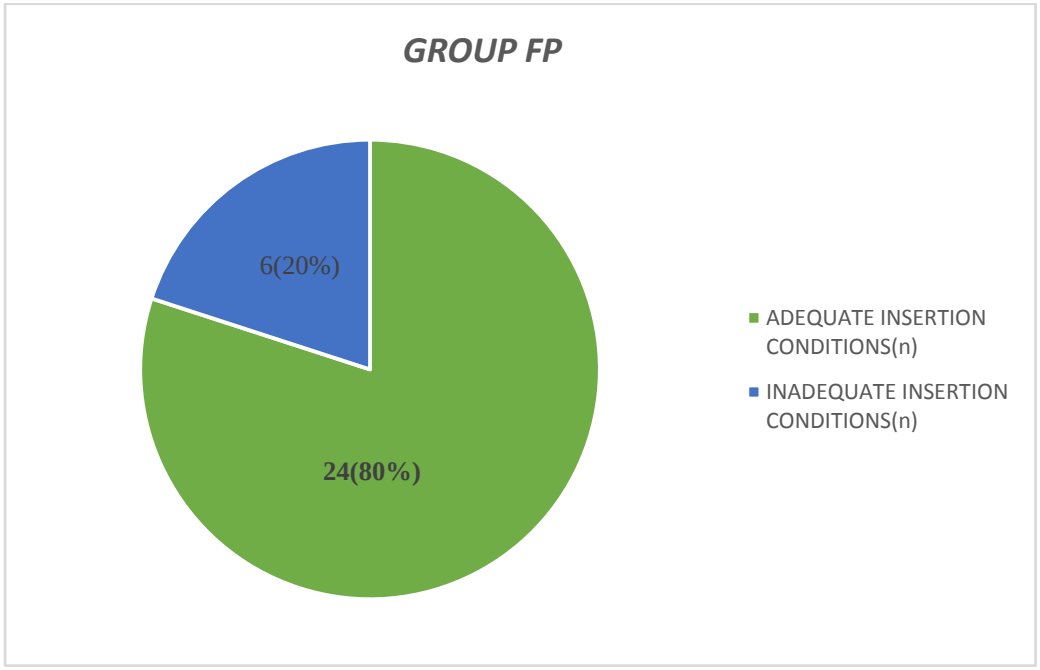
UNACCEPTABLE CONDITION OF LMA INSERTION:

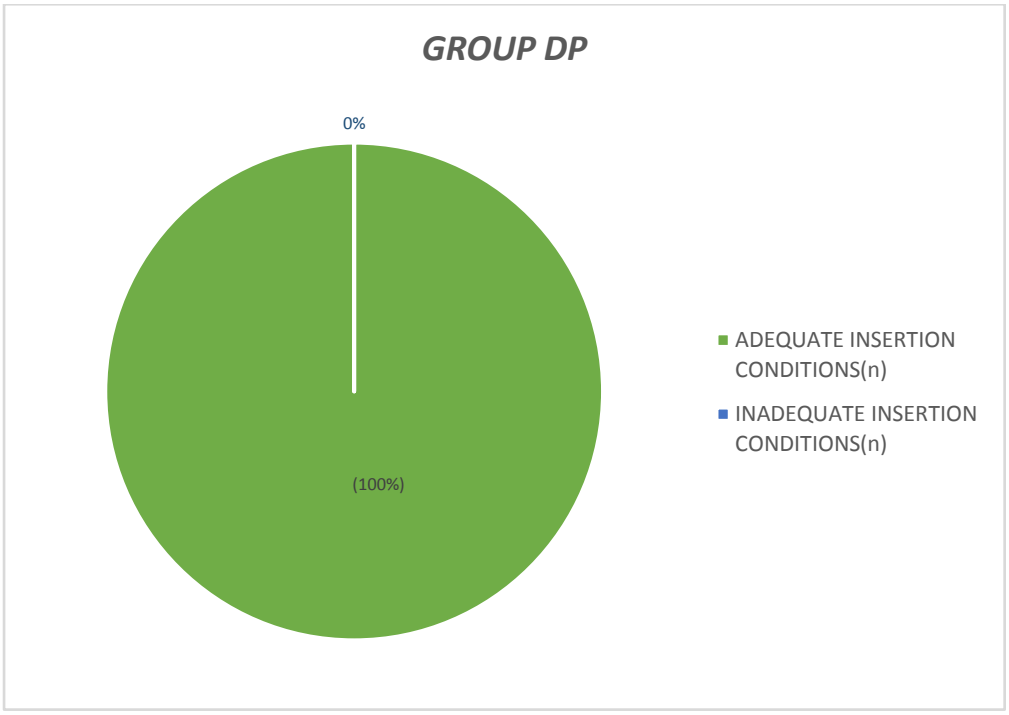
TABLE 10: UNACCEPTABLE CONDITIONS FOR LMA INSERTION

	GROUP F_P n (%)	**GROUP D_P n (%)**	**STATISTICAL INTERFERENCE**
TOTAL NO. OF PATIENTS WITH UNACCEPTABLE CONDITIONS OF LMA INSERTION	6 (20%)	0 (0%)	X^2=6.667 Df=1 ***.010<0.05 Significant***

In group Fp, 6 (20%) patients showed unacceptable condition for LMA insertion whereas in the group Dp, all the patients had optimal conditions for insertion of LMA with significant p value of 0.010.

CHART 7: UNACCEPTABLE CONDITIONS FOR LMA INSERTION





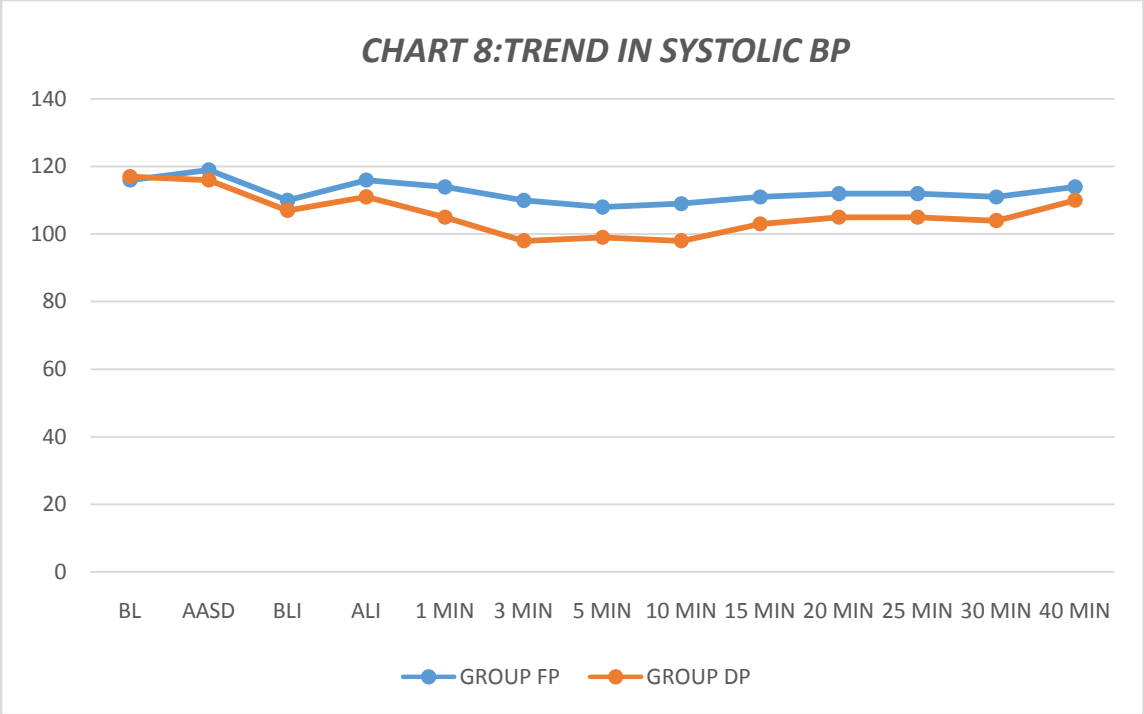
TRENDS IN HEMODYNAMIC PARAMETERS:

SYSTOLIC BP:

TABLE 11 : SYSTOLIC BP

SYSTOLIC BP	GROUP F_P	GROUP D_P	*P VALUE*
BL	116.23±8.8	117.03±7.95	0.713
AASD	118.57±7.9	115.53±10.3	0.209
BLI	110.27±11.43	107.2±9.65	0.266
ALI	116.10±12.10	110.60±11.99	0.082
1 MIN	113.87±13.51	104.50±10.91	***0.005***
3 MIN	110.40±13.91	97.67±9.77	***0.000***
5 MIN	107.87±11.85	99.03±8.13	***0.001***
10 MIN	108.53±10.32	97.63±11.46	***0.000***
15 MIN	110.87±7.85	102.83±9.69	***0.001***
20 MIN	112.30±6.98	104.53±7.51	***0.000***
25 MIN	111.53±7.02	104.80±6.64	***0.000***
30 MIN	111.7±10.28	105.17±4.67	***0.002***
40 MIN	113.55±8.2	109.90+4.78	0.356

BL-baseline , AASD-after administration of study drug , BLI-before LMA insertion , ALI-after LMA insertion



Group Dp, when compared to the group Fp showed decreasing trend in systolic blood pressure from 1 minute following LMA insertion till 30 minutes postinsertion, after which no comparable difference was observed between the two groups.

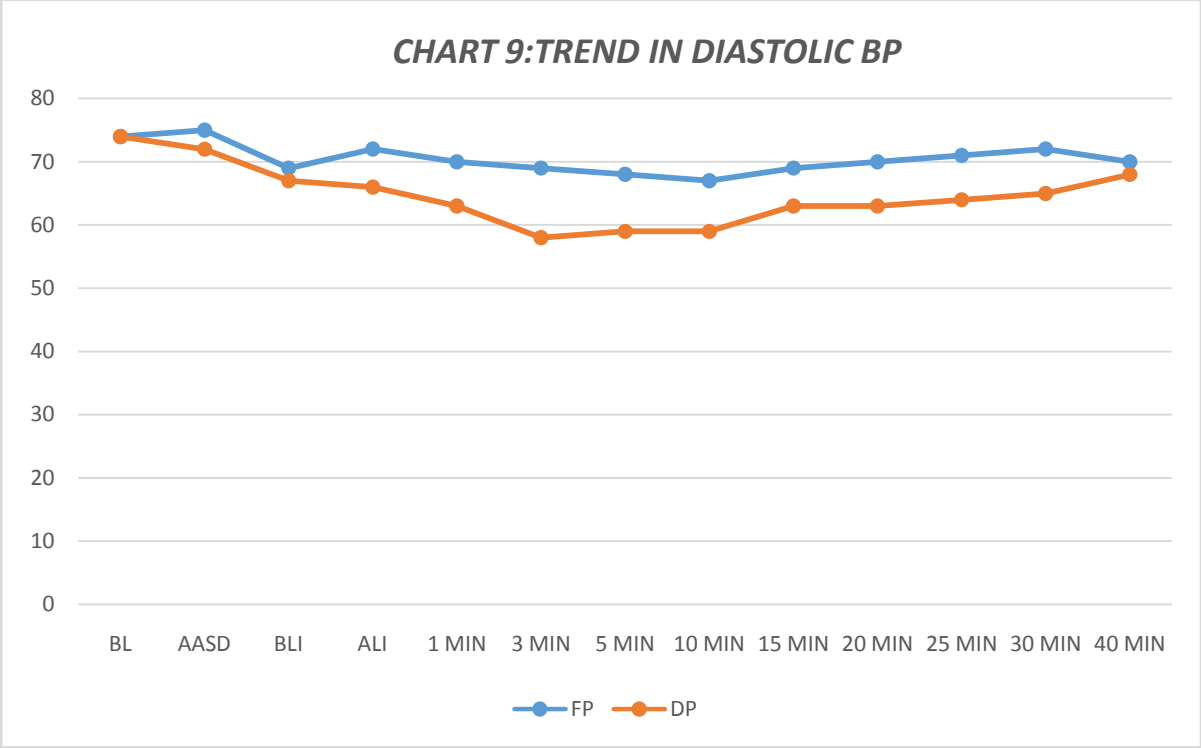
Statistically significant decrease in mean systolic blood pressure was seen in the group Dp, in post LMA period starting from 1 min till the end of 30 minutes with p value < 0.05.

DIASTOLIC BP:

TABLE 12: DIASTOLIC BP

DIASTOLIC BP	GROUP F_P	GROUP D_P	P VALUE
BASELINE	74.13±5.83	73.97±6.91	0.920
AASD	75.17±6.54	72.40±7.65	0.138
BLI	69.03±7.71	67.13±8.84	0.379
ALI	72.27±8.32	67.67±10.21	0.061
1MIN	69.60±10.05	63.97±10.70	***0.040***
3 MIN	69.13±9.08	58.70±11.09	***0.000***
5 MIN	68.10±9.33	59.60±10.36	***0.001***
10 MIN	67.30±9.34	59.63±10.11	***0.002***
15 MIN	68.87±6.83	63.10±10.08	***0.012***
20 MIN	69.60±4.73	63.53±7.13	***0.000***
25 MIN	69.50±6.07	64.43±5.30	***0.001***
30 MIN	69.77±7.26	64.57±3.66	***0.001***
40 MIN	70.14±6.57	67.90±4.10	0.873

BL-baseline , AASD-after administration of study drug , BLI-before LMA insertion , ALI-after LMA insertion

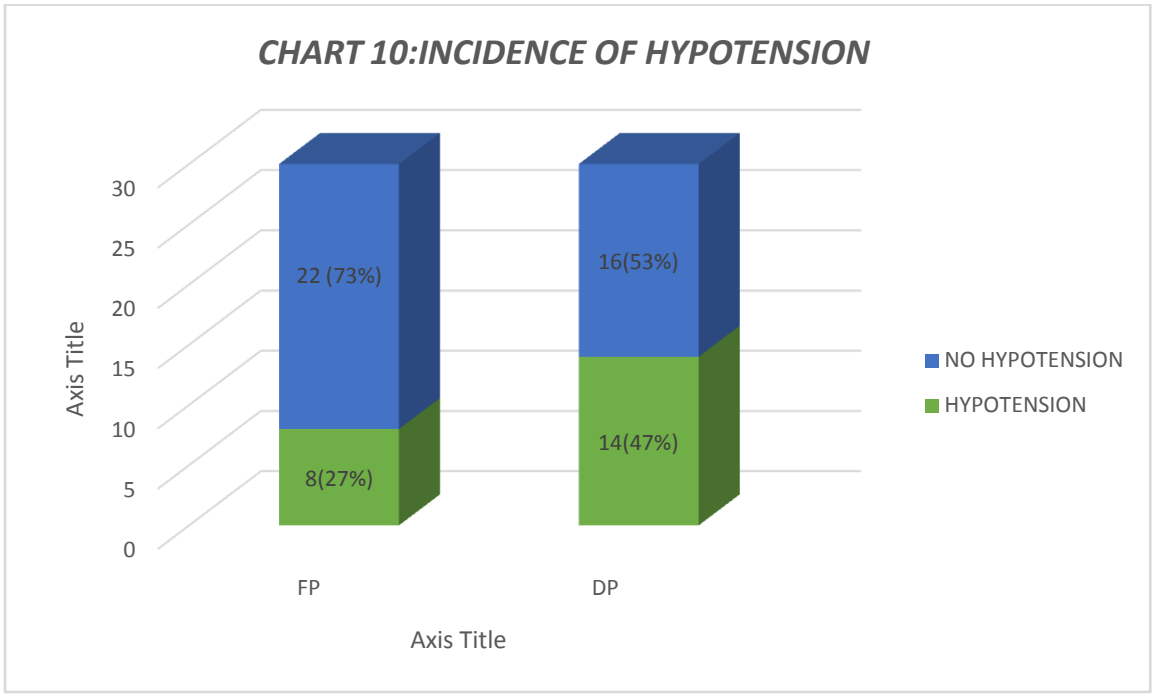


Diastolic blood pressure of the group Dp showed decreasing trend similar to that of systolic blood pressure. It showed statistically significant decrease from 1 minute post LMA insertion till 30 minutes post insertion after which there was no significant difference noted between the two groups in the trend of diastolic blood pressure.

EPHEDRINE USAGE:

TABLE 13: EPHEDRINE USAGE

EPHEDRINE USE	GROUP F_P n (%)	GROUP D_P n (%)	STATISTICAL INTERFERENCE P value
NUMBER OF CASES	8 (26.66%)	14 (46.66%)	0.997



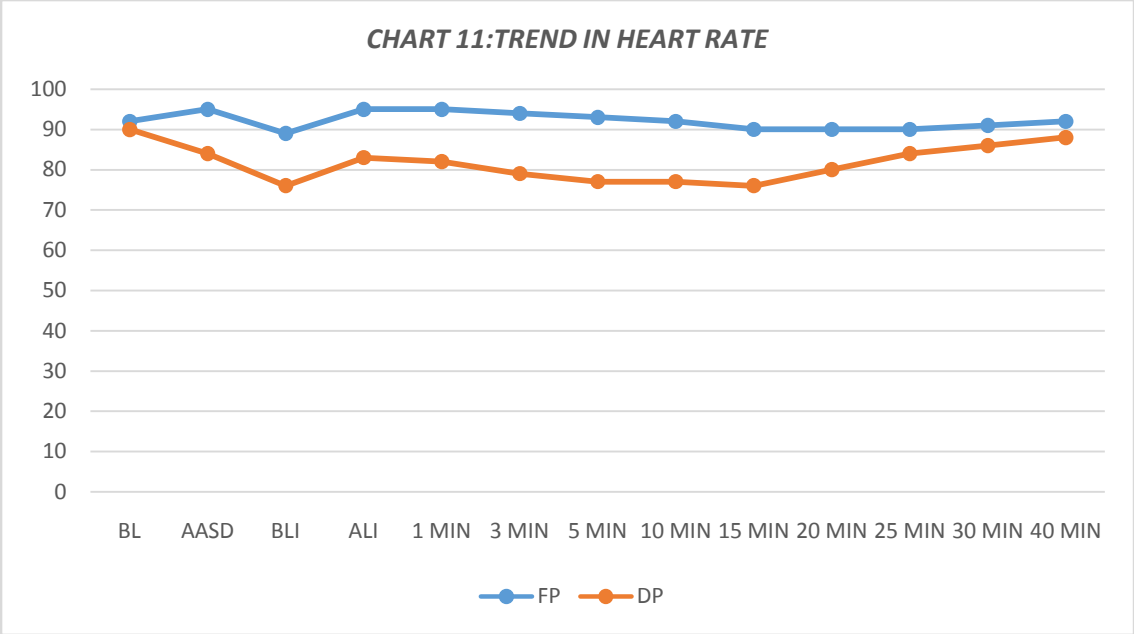
In the group Fp, 8 patients were treated with Inj. Ephedrine while in the group Dp 14 patients required Inj. Ephedrine for their hypotension. There was no statistically significant relationship between the two groups in terms of ephedrine usage as the p value is 0.997.

HEART RATE :

TABLE 14: HEART RATE

HEART RATE	GROUP F_P	GROUP D_P	p VALUE
BASELINE	92.30±13.87	90.43±13.70	0.602
AASD	94.53±16.19	83.90±19.11	0.064
BLI	89.23±14.04	76.77±12.71	***0.001***
ALI	95.07±15.21	83.60±15.20	***0.005***
1 MIN	95.47±16.57	82.27±13.93	***0.001***
3 MIN	93.80±15.01	79.27±12.52	***0.000***
5 MIN	93.03±14.35	77.40±11.47	***0.000***
10 MIN	91.67±13.85	76.53±11.82	***0.000***
15 MIN	90.33±11.66	77.13±12.36	***0.000***
20 MIN	90.43±12.25	80.03±8.88	***0.000***
25 MIN	90.03±11.93	84. 03±7.63	0.081
30 MIN	90.63±11.69	86.23±6.86	0.087
40 MIN	91.41±10.20	88.10±6.40	0.165

BL- baseline , AASD-after administration of study drug , BLI-before LMA insertion , ALI-after LMA insertion



In both F_P and D_P group , the baseline heart rate was comparable and the Group D_P showed decreasing trend in the heart rate following administration of study drug till 20 minutes after LMA insertion, after which the heart rate was comparable in both the groups.

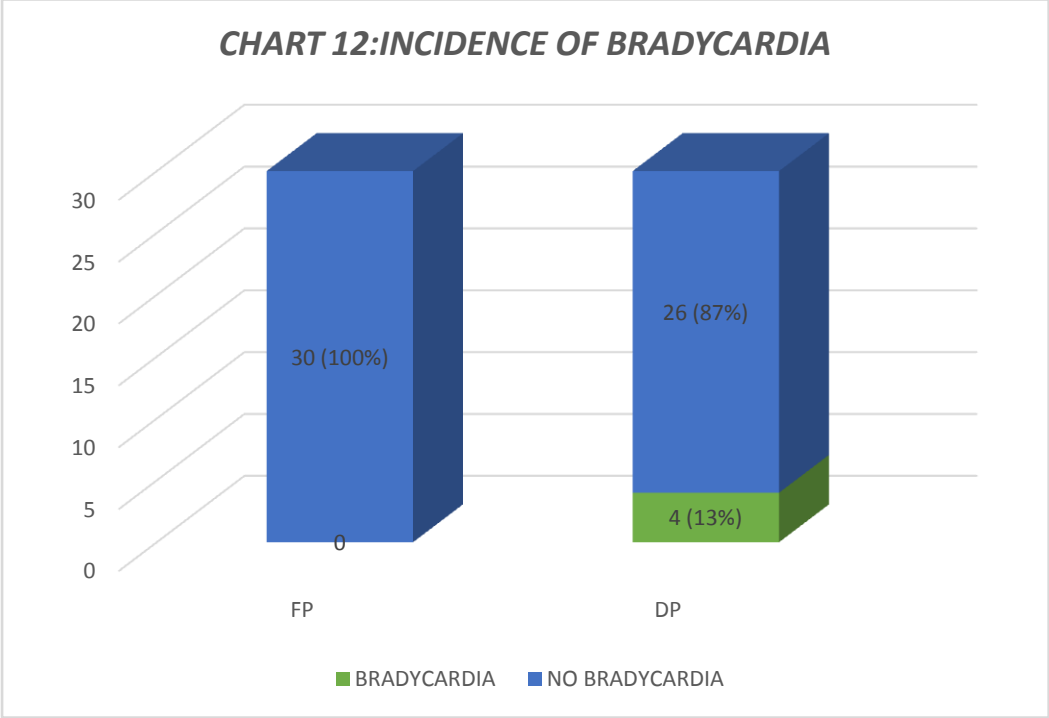
Significant fall in heart rate was noted in the study group after administration of study drug till the end of 20 minutes with p value < 0.05.

ATROPINE USAGE:

TABLE 15: ATROPINE USAGE

ATROPINE USE	GROUP F_P (n)	GROUP D_P(n)	STATISTICAL INTERFERENCE
NUMBER OF CASES	0	4	**0.039**

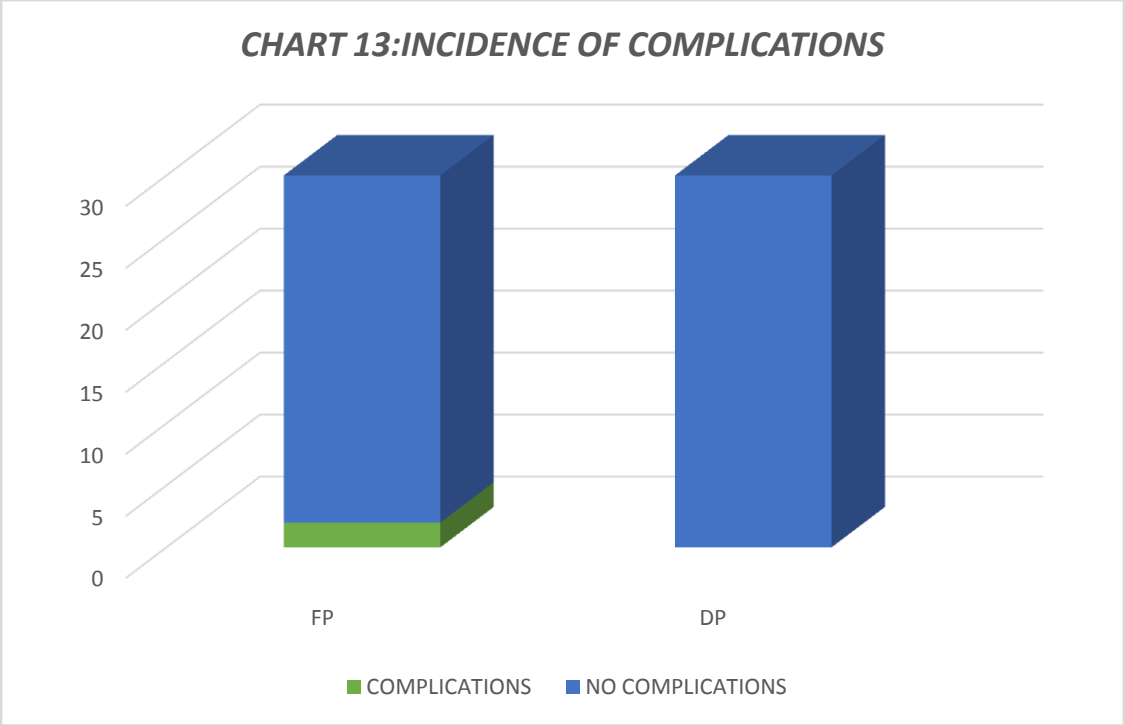
Atropine was not used for any of the patients in the group Fp. Atropine is used to treat bradycardia in 4 patients in the group Dp. The calculated p value is 0.039 reflecting the statistical significance in atropine usage between the two groups.



INCIDENCE OF COMPLICATIONS:

TABLE 16: INCIDENCE OF COMPLICATIONS

COMPLICATIONS	GROUP F_P (n)	GROUP D_P (n)	STATISTICAL INTERFERENCE
BRONCHOSPASM	0	0	X^2=2.069 Df=1 .150>0.05 Not Significant
LARYNGOSPASM	0	0	
BLOOD STAIN ON LMA	2	0	
NO COMPLICATIONS	28	30	



In the control group, 2 patients had traumatic insertion of LMA indicated by blood on LMA on removal and no patient in the study group showed any complications during or after LMA insertion.

DISCUSSION

Insertion of LMA needs adequate depth of anaesthesia to suppress the upper airway reflexes and to achieve good relaxation of the jaw muscles for adequate mouth opening.

Previously, volatile anaesthetic agents like sevoflurane and Thiopentone were popularly used as an induction agent for insertion of LMA. Nowadays, Propofol is the most commonly used induction agent for insertion of LMA.

When used alone, propofol provides less satisfactory conditions for LMA insertion and more dose of propofol (> 2mg/kg) is needed to achieve optimal insertion conditions for LMA. Propofol at higher doses can produce significant hypotension, bradycardia and respiratory depression. So, Opioids or other anaesthetic agents were being tried as an adjuvant for propofol to decrease the dose of propofol in order to decrease the suppression of cardiopulmonary system caused by propofol. Opioids increases the incidence and duration of apnoea and Many newer drugs are being studied to achieve optimal insertion conditions for LMA with fewer side effects.

Dexmedetomidine is a selective alpha 2 agonists known for its sedative, analgesic and sympatholytic properties and in my study, evaluation of dexmedetomidine was done in terms of insertion conditions for LMA and it has been compared with fentanyl propofol combination.

Dosage of fentanyl used in my study was 2 mcg/kg and it was based on the study conducted by Goyagi et al[43] in 41 healthy patients who found that Pre administration of fentanyl 2mcg/kg decreases the propofol requirement for the insertion of LMA.

Dexmedetomidine was used in the dosage of 1 mcg/kg and it was based on the study of Kwak et al[44], on 22 patients undergoing minor orthopaedic or gynaecological surgeries. He found that the single dose of dexmedetomidine for successful insertion of LMA in 50% of patients was 0.55 mcg/kg when used along with propofol induction at the dose of 2mg/kg.

Propofol dose used was 2mg/kg and it was based on the study conducted by Blake et al[51] who studied four induction doses of propofol (1.5-2.5mg/kg) and reported that LMA insertion was less successful at the dose of 1.5mg/kg.

Jaw relaxation was comparable in both dexmedetomidine - propofol group and fentanyl-propofol group. In group D_P, 100% of the patients achieved acceptable jaw grading for LMA insertion while in group F_P only 90% of the patients achieved acceptable grading of jaw relaxation. This results were similar to the results obtained by AH Ramasamy et al[37] who studied the same combination of drugs on 80 patients,40 patients in each group where Dexmedetomidine, Fentanyl and Propofol were used at the dose of 1 mcg/kg.1mcg/kg and 2 mg/kg respectively.

Group D_P was superior to group Fp in terms of cough grading and is in line with the study conducted by Wee. P et al and Wong CM et al[52] who reported that

higher doses of fentanyl (>1 mcg/kg) was associated with a notable increase in the incidence of coughing. In group Dp all the 30 (100%) patients had acceptable cough grading for LMA insertion while in group F_P only 26 (86.6%) patients had acceptable grading of cough for LMA insertion with significant p value of 0.038. The remaining 4 patients received additional dose of propofol (0.5mg/kg) for LMA insertion and LMA insertion was made in the second attempt.

In group Dp all the LMA insertions were made in the first attempt whereas in group Fp 24 insertions were made in first attempt and 6 insertions were made in the second attempt. The second attempt of LMA insertion was required in 2 patients with grade 4 jaw relaxation, in 2 patients with grade 3 cough and in 2 patients with grade 4 cough. Thus group Dp was found to be superior to group Fp in terms of first attempt success rate. This result was similar to that found by Surabhi et al[39] who reported that dexmedetomidine along with propofol provides better insertion conditions than that of fentanyl with propofol and it can be used with an advantage for insertion of LMA during short surgical procedures. The anaesthetic sparing effect of dexmedetomidine may be the reason for achieving good insertion conditions for LMA with the propofol dose of 2mg/kg in group Dp which was supported by the study conducted by Kanda H et al[53] who concluded that mean effect site concentration of propofol in the dexmedetomidine – propofol group was significantly lower than that of propofol only group.

All the patients in both the groups showed adequate ventilation after placement of LMA.

Supporting the study conducted by surabhi et al[39], In my study, group Dp showed statistically significant fall in both the systolic and diastolic blood pressure from 1 minute post insertion of LMA till 30 minutes when compared to group Fp. Further, the incidence of hypotension was more in group Dp when compared to the group Fp. In group Dp, 14 patients (47%) had hypotension which was treated with Inj. Ephedrine 6 mg IV and in group Fp , only 8 patients (27%) received Inj. Ephedrine for hypotension.

Group Dp showed statistically significant fall in mean heart rate after administration of the study drug till 20 minutes post insertion of LMA. The incidence of bradycardia was more in group Dp when compared with group Fp with statistical significance (p value<0.05) between the two groups. In group Dp, 4 patients were treated with Inj. Atropine 0.6mg IV and no patients in group Fp received Inj. Atropine. This was on contrary to the study conducted by AH Ramasamy[37] et al who observed only mild reduction in heart rate throughout the study in dexmedetomidine group without the incidence of bradycardia. Thus,in our study, it was observed that the use of dexmedetomidine at the dose of 1 mcg/kg along with Propofol 2mg/kg increases the incidence of hypotension and bradycardia than that of fentanyl (2 mcg/kg) - propofol (2mg/kg) combination.

Our study showed that Dexmedetomidine provides better insertion conditions than that of fentanyl when used along with propofol for insertion of

LMA. More than attenuation of pressor responses to LMA insertion, dexmedetomidine at the dose of 1 mcg/kg produces significant bradycardia and hypotension necessitating more use of vasopressors.

My study has some limitations such that propofol alone group as a control has not been included for better understanding of the effect of fentanyl and dexmedetomidine on insertion of laryngeal mask airway. Respiratory depression caused by opioids and effect of dexmedetomidine in preserving respiration has not been studied.

SUMMARY

This study titled **'COMPARISON OF DEXMEDETOMIDINE COMBINED WITH PROPOFOL AND FENTANYL COMBINED WITH PROPOFOL FOR LMA INSERTION IN SHORT SURGERIES PERFORMED UNDER GA'** was conducted at Mahatma Gandhi memorial hospital, Trichy during the period of April 2015 – April 2016.The total sample size was 60 which included 2 groups.

Fp - Propofol with fentanyl (30)

Dp - Propofol with Dexmedetomidine (30)

Patients of ASA category I-II of age 18-60 years with weight 30-70 kg and MPC Category I-I Undergoing elective superficial surgeries under GA were included in the study.

With adequate period of fasting, on the day of surgery, patients were shifted to the operating room and connected to monitors. After preoxygenation and premedication, Group Fp received 2 microgram/kg of Inj. Fentanyl in 100ml of normal saline over 10 minutes and Group Dp received 1 microgram/kg of Inj. Dexmedetomidine in 100 ml of NS over 10 minutes. After 3 minutes, Inj. Propofol 2 mg/kg was given to both the groups.90 seconds after propofol injection, the first attempt of LMA insertion was made and ease of insertion of LMA was assessed .

The ease of insertion of LMA was assessed with

1. Jaw relaxation

2. Coughing during LMA insertion

3. Number of attempts

4. Adequacy of ventilation.

5. Incidence of complications.

If the first attempt of LMA placement was failed in either of the groups, additional dose of Inj.Propofol 0.5mg/kg was given and second attempt of LMA insertion was made. Jaw relaxation grade >2, Coughing grade >2 and adequacy of ventilation of grade 3 were considered as failure in LMA placement. Pre and Post insertion hemodynamics were also noted.

Jaw relaxation, adequacy of ventilation and incidence of complications were all comparable between the two groups. Group Dp was found to be superior in terms of first attempt success rate than that of group Fp. Fall in systolic BP, diastolic BP and heart rate was more in group Dp when compared to group Fp.

We found that Dexmedetomidine when used at the dose of 1 mcg/kg along with propofol (2mg/kg) provides better insertion conditions for LMA than that of fentanyl 2 mcg/kg along with propofol (2mg/kg).However, the incidence of Bradycardia and Hypotension was more in Dexmedetomidine group than that of fentanyl group.

CONCLUSION

We concluded that Dexmedetomidine when combined with propofol provides better insertion conditions for laryngeal mask airway than that of fentanyl combined with propofol. However there was increased incidence of bradycardia and hypotension in dexmedetomidine group necessitating more usage of vasopressors.

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PROFORMA

NAME	AGE	SEX	IP NO
DATE	WEIGHT	DIAGNOSIS	PROCEDURE
ASA STATUS	MPC STATUS	LAST ORAL INTAKE	SHIFTED TO OT TIME

ADDRESS :

IV ACCESS :

TIME OF ADMINISTRATION OF STUDY DRUG :

DOSAGE GIVEN :

TIME OF INSERTION OF LMA :

EASE OF INSERTION OF LMA :

JAW RELAXATION GRADING -

COUGH GRADING -

NUMBER OF ATTEMPTS -

ADEQUACY OF VENTILATION GRADING -

INCIDENCE OF COMPLICATIONS -

HEMODYNAMIC RESPONSES MONITORING:

TIME	HEART RATE	SYSTOLIC BP	DIASTOLIC BP	SPO2
BASELINE				
AFTER ADMINISTRATION OF STUDY DRUG				
BEFORE LMA INSERTION				
AFTER LMA INSERTION				
1 MIN				
3 MIN				
5 MIN				
10 MIN				
15 MIN				
20 MIN				
25 MIN				
30 MIN				
40 MIN				

EPHEDRINE USAGE :

ATROPINE USAGE :

DURATION OF SURGERY :

சுய ஒப்புதல் படிவம்

லரிஞ்சியில் மாஸ்க் ஏர்வே மூலம் முழு மயக்கம் கொடுத்து செய்யப்படும் அறுவை சிகிச்சைக்கு கொடுக்கப்படும் மருந்துகள், பரொபபால் மற்றும் ∴பென்டனில் அல்லது பரொபபால் மற்றும் டெக்ஸ்மெடிடோமிடின் இரு மருந்துகளையும் ஒப்பிடும் ஆய்வு.

ஆராய்ச்சி நிலையம் : மகாத்மாகாந்தி நினைவு அரசு மருத்துவமனை, திருச்சிராப்பள்ளி.

பங்கு பெறும் நோயாளியின் பெயர்: வயது :

பங்கு பெறும் நோயாளியின் எண் : பாலினம் :

பெற்றோர் உடனிருப்போர் விலாசம் :

பெற்றோர் உடனிருப்போர் இதனை ( ) குறிக்கவும்

மேலே குறிப்பிட்டுள்ள மருத்துவ ஆய்வின் விவரங்கள் எனக்கு விளக்கப்பட்டது. என்னுடைய சந்தேகங்களை கேட்கவும் அதற்கான தகுந்த விவரங்களை பெறவும் வாய்ப்பளிக்கப்பட்டது.

நான் நோயாளியை இவ்வாய்வில் தன்னிச்சையாகத்தான் பங்கேற்க வைக்கிறேன். எந்த கட்டத்திலும் எந்த சட்ட சிக்கலுக்கும் உட்படாமல் நோயாளியை இவ்வாய்வில் இருந்து விலக்கிக் கொள்ளலாம் என்றும் அறிந்து கொண்டேன்.

இந்த ஆய்வு சம்மந்தமாகவோ மேலும் இதை சார்ந்த ஆய்வு மேற்கொள்ளும் போதும், இந்த ஆய்வில் பங்குபெறும் மருத்துவர் நோயாளியுடைய மருத்துவ அறிக்கைகளை பார்ப்பதற்கு என் அனுமதி தேவையில்லை என அறிந்து கொள்கிறேன். நோயாளியை ஆய்வில் இருந்து விலக்கிக் கொண்டாலும் இது பொருந்தும் என அறிகிறேன்.

இந்த ஆய்வின் மூலம் கிடைக்கும் தகவல்களையும் பரிசோதனை முடிவுகளையும் மற்றும் சிகிச்சை தொடர்பான தகவல்களையும் மருத்துவர் மேற்கொள்ளும் ஆய்வில் பயன்படுத்திக் கொள்ளவும் அதை பிரசுரிக்கவும் என் முழு மனதுடன் சம்மதிக்கிறேன்.

இந்த ஆய்வில் நோயாளியை ஈடுப்படுத்த முழு மனதுடன் ஒப்புக்கொள்கிறேன். இந்த மயக்க மருந்துகள் மற்றும் மயக்க முறையினால் ஏற்ப்பட கூடிய பின் விளைவுகள் மற்றும் எதிர்பாராத விளைவுகள் பற்றி எனக்கு விளக்கமாக தெரிவிக்கப்படுகிறது.

இந்த ஆய்வில் நோயாளிகளுக்கு பரொபபால் மற்றும் ∴பென்டனில் அல்லது பரொபபால் மற்றும் டெக்ஸ்மெடிடோமிடின் என்னும் மருந்துகள் கொடுத்து பின் லரிஞ்சியில் மாஸ்க் ஏர்வே பொருத்தப்பட்டு அதன் மூலம் அறுவை சிகிச்சை செய்யப்படுகிறது. இந்த ஆய்வினையும் அனைத்து வித பரிசோதனைகளையும் செய்து பார்க்க நான் முழு மனதுடன் சம்மதிக்கிறேன்.

நோயாளியின் நலன் கருதியே இந்த ஆய்வு மேற்கொள்ளப்படுகிறது என்று தெரிந்து இந்த ஆய்விற்கு ஒப்புதல் அளிக்கின்றேன்.

இடம் :

தேதி : **பெற்றோர் / உடனிருப்போர் கையொப்பம்**

KEY TO MASTER CHART

S NO	-	Serial number
Group		
1	-	Fp group
2	-	Dp group
SEX:		
1	-	Male
2	-	Female
Wt	-	Weight
Diag	-	Diagnosis
1	-	Fibroadenoma
2	-	Gynacomastia
Proc	-	Procedure
1	-	Excision biopsy
2	-	Webster operation
ASA	-	American society of anesthesiologist risk classification.
MPC	-	Mallampatti classification.
Jaw gr	-	Jaw relaxation grading
Cough gr	-	Cough grading
Atmpts	-	Number of attempts
ADQCY	-	Adequacy of ventilation
COMP	-	Incidence of complications
EPDRNE	-	Ephedrine usage
ATROPIN	-	Atropine usage
DURATN	-	Duration of surgery
H	-	Heart rate

SBP	-	Systolic BP
DBP	-	Diastolic BP
SPO	-	Oxygen Saturation
BL	-	Baseline
AASD	-	After administration of study drug
BLI	-	Before LMA insertion
ALI	-	After LMA insertion
Min	-	Minute
999	-	Not applicable.

S.NO	GROUP	AGE	SEX	WT	DIAG	PROCE	ASA	MPC	JAW Gr	COUGH Gr	ATMPTS	ADQCY	COMP	H BL	H AASD	H BLI	H ALI	H 1MIN	H 3MIN	H 5MIN	H 10MIN	H15MIN	H20MIN	H25MIN	H30MIN	H40MIN	H 50MIN	H 60MIN	SBPBL	SBP AASD	SBPBLI	SBP ALI	SBP1MIN	SBP3MIN	SBP5MIN	SBP10MIN	SBP15MIN	SBP20MIN	SBP25MIN	SBP30MIN	SBP40MIN
1	1	33	2	50	1	1	1	1	2	4	1	1	0	86	78	76	98	102	105	108	98	101	95	91	92	95	93	91	124	118	112	126	129	134	131	128	124	119	116	115	119
2	1	21	2	42	1	1	1	1	1	1	1	1	0	78	84	76	77	82	81	84	80	78	79	76	75	999	999	999	108	112	98	101	104	107	108	111	109	110	108	76	999
3	1	40	2	55	1	1	1	1	2	1	1	1	0	72	79	74	86	81	83	88	83	84	86	87	85	84	999	999	133	127	97	115	118	115	116	119	117	122	121	119	116
4	1	25	2	48	1	1	1	1	1	1	1	1	0	82	85	78	84	82	78	80	83	81	85	84	81	82	88	999	120	114	117	124	99	80	106	105	109	107	103	101	108
5	1	26	2	43	1	1	1	1	1	1	1	1	0	121	125	109	118	116	108	113	112	107	105	103	107	102	999	999	111	114	93	102	104	108	107	111	117	126	118	115	119
6	1	29	2	54	1	1	1	1	1	1	1	1	0	92	86	82	86	84	82	85	88	83	81	78	83	86	89	999	106	114	94	96	103	118	112	109	107	112	116	111	106
7	1	32	2	49	1	1	1	1	1	2	1	2	3	104	98	94	101	104	108	112	105	98	96	94	91	96	999	999	114	116	109	122	128	132	119	108	105	103	99	104	107
8	1	25	2	56	1	1	1	1	4	1	2	1	0	112	118	116	112	108	109	110	106	104	107	101	98	103	105	108	112	109	106	109	99	90	78	92	101	103	107	112	100
9	1	33	2	61	1	1	1	1	1	1	1	1	0	79	75	71	76	79	77	75	73	74	76	79	81	83	999	999	105	110	96	102	105	112	109	113	107	105	111	108	113
10	1	24	1	58	2	2	1	1	1	1	1	1	0	85	88	82	89	93	95	91	88	87	85	83	86	89	91	999	108	115	109	104	95	83	110	114	107	104	101	106	108
11	1	28	2	48	1	1	1	1	1	1	1	1	0	86	92	94	98	102	97	95	92	89	91	87	85	81	83	999	121	119	114	125	129	122	118	114	115	109	112	116	113
12	1	33	2	55	1	1	1	1	2	3	1	1	3	83	94	98	109	119	125	118	112	109	105	107	106	104	999	999	123	132	107	125	134	127	121	118	115	113	118	122	119
13	1	31	2	50	1	1	1	1	1	1	1	1	0	88	95	93	98	96	94	90	92	88	86	83	85	87	86	999	115	119	108	111	117	114	109	107	110	114	118	124	132
14	1	22	2	45	1	1	1	1	4	1	2	1	0	96	108	114	119	115	107	105	104	106	103	109	111	115	999	999	128	123	113	119	122	118	115	116	120	121	124	125	118
15	1	30	2	52	1	1	1	1	1	1	1	1	0	79	85	76	82	85	79	75	72	76	73	78	81	83	80	999	107	115	95	106	103	105	104	105	108	103	101	108	107
16	1	33	2	56	1	1	1	1	2	2	1	2	0	91	98	86	95	98	97	101	103	99	96	95	93	94	92	999	117	120	115	118	106	104	101	111	114	119	124	133	129
17	1	25	2	44	1	1	1	1	1	1	1	1	0	95	98	85	87	83	86	81	78	76	77	79	81	83	78	999	105	112	109	117	114	108	91	85	113	118	108	105	101
18	1	26	2	49	1	1	1	1	1	1	1	1	0	83	86	85	94	98	104	96	95	90	91	97	101	97	999	999	135	140	129	142	136	125	119	125	122	118	115	119	123
19	1	24	2	44	1	1	1	1	1	1	1	1	0	108	119	106	105	101	96	94	95	92	97	99	95	99	97	999	113	124	117	128	132	126	121	118	115	119	114	111	116
20	1	25	2	48	1	1	1	1	1	1	1	1	0	122	128	115	123	127	114	109	112	108	110	113	108	105	999	999	119	125	134	140	134	114	101	90	115	122	114	109	105
21	1	36	1	60	2	2	1	1	1	1	1	1	0	87	84	81	85	89	91	87	85	82	81	84	89	86	90	93	116	112	91	97	93	98	103	108	112	107	105	113	116
22	1	29	2	53	1	1	1	1	1	1	1	1	0	81	78	73	77	72	75	81	84	80	86	83	79	82	85	999	109	123	118	135	139	128	122	119	122	116	113	121	124
23	1	24	2	51	1	1	1	1	1	1	1	1	0	119	124	103	115	111	106	105	109	98	96	95	99	102	105	106	112	118	122	116	110	113	111	108	106	112	115	118	122
24	1	26	2	46	1	1	1	1	1	1	1	1	0	95	99	88	84	81	85	83	82	86	81	78	84	82	87	999	108	107	109	104	102	98	97	95	99	103	108	105	104
25	1	31	2	62	1	1	1	1	1	1	1	1	0	87	83	79	85	83	89	87	82	88	91	85	87	82	85	999	114	121	104	106	101	94	87	106	113	104	105	112	115
26	1	22	2	42	1	1	1	1	1	1	1	1	0	93	85	77	72	68	65	69	71	75	72	76	73	79	999	999	125	114	118	123	116	118	114	109	106	112	111	113	108
27	1	23	2	46	1	1	1	1	2	3	1	2	0	112	116	107	119	125	117	109	112	108	115	111	118	107	999	999	127	134	123	118	112	105	101	93	87	114	118	106	107
28	1	27	2	53	1	1	1	1	3	4	1	2	0	94	99	103	115	121	109	113	107	105	111	108	104	101	98	999	111	121	128	112	104	92	85	96	105	117	113	112	115
29	1	21	2	43	1	1	1	1	1	1	1	1	0	74	71	75	78	76	73	72	69	76	72	71	75	79	999	999	109	105	101	114	109	107	106	105	105	102	98	96	104
30	1	25	2	49	1	1	1	1	1	1	1	1	0	85	78	81	85	83	79	75	78	82	84	87	86	83	81	999	132	124	122	126	119	117	114	118	121	115	112	116	119
31	2	23	2	52	1	1	1	1	1	1	1	1	0	73	70	68	83	88	78	86	83	85	86	83	87	89	91	999	106	109	104	114	112	108	96	82	125	112	107	105	101
32	2	27	2	48	1	1	1	1	1	1	1	1	0	110	108	98	103	98	91	87	78	75	81	83	79	80	999	999	120	117	101	98	90	84	103	105	106	101	98	104	109
33	2	25	2	42	1	1	1	1	1	1	1	1	0	123	119	92	88	78	73	64	74	78	75	73	76	81	999	999	125	120	112	104	105	86	95	97	88	114	117	104	107
34	2	28	2	54	1	1	1	1	1	1	1	1	0	84	72	70	67	64	62	74	78	76	75	73	79	81	77	999	123	105	102	109	101	97	89	97	90	97	96	95	99
35	2	35	2	62	1	1	1	1	1	1	1	1	0	78	53	55	52	51	47	92	89	85	82	78	80	79	999	999	119	125	108	100	90	81	96	101	102	105	103	106	101
36	2	19	2	42	1	1	1	1	1	1	1	1	0	84	78	65	64	67	63	54	52	48	62	74	83	86	999	999	124	112	108	102	99	97	95	85	107	111	109	113	115
37	2	22	2	45	1	1	1	1	1	1	1	1	0	95	114	79	103	91	79	60	62	64	68	71	73	69	73	999	114	109	108	115	109	105	103	96	94	99	101	104	106
38	2	26	2	49	1	1	1	1	2	2	1	2	0	78	58	54	94	98	92	88	84	86	83	89	87	86	999	999	126	138	121	132	123	114	105	103	96	99	102	104	107
39	2	29	1	62	2	2	1	1	1	1	1	1	0	77	73	80	60	70	77	72	68	75	78	77	74	76	73	79	116	121	110	101	107	88	112	105	101	107	106	104	108
40	2	32	2	47	1	1	1	1	1	1	1	1	0	79	68	65	75	71	82	86	88	94	91	93	89	87	85	999	118	116	99	131	126	101	103	94	100	95	98	102	105
41	2	25	2	43	1	1	1	1	1	1	1	1	0	82	75	59	69	78	73	78	82	85	87	82	80	78	999	999	112	124	105	128	92	93	86	103	100	104	101	106	102
42	2	18	2	46	1	1	1	1	1	1	1	1	0	89	79	68	74	79	83	78	72	61	60	64	69	71	75	999	106	107	96	94	87	115	95	96	90	86	102	105	108
43	2	27	2	55	1	1	1	1	1	1	1	1	0	98	93	95	103	105	97	85	81	83	86	82	84	80	79	999	114	109	96	124	117	105	101	98	94	99	103	106	109
44	2	34	2	57	1	1	1	1	2	1	1	2	0	114	93	85	98	92	78	61	60	58	71	75	78	77	84	999	121	96	88	101	110	107	112	105	108	103	99	102	109
45	2	31	1	58	2	2	1	1	1	1	1	1	0	75	72	71	82	89	92	84	81	78	76	72	75	79	77	76	104	107	103	111	108	105	95	81	122	113	108	104	102
46	2	26	2	46	1	1	1	1	1	1	1	1	0	98	104	91	96	99	90	85	83	79	86	88	92	89	93	999	109	106	102	95	92	83	110	118	107	105	101	103	106
47	2	28	2	49	1	1	1	1	1	1	1	1	0	84	92	76	74	73	79	82	86	80	85	89	87	86	999	999	111	107	103	98	99	95	101	102	108	113	115	112	109
48	2	23	1	53	2	2	1	1	1	1	1	1	0	113	107	92	91	84	81	75	82	84	85	82	79	83	87	89	125	132	128	123	115	102	96	91	102	107	105	108	103
49	2	29	2	41	1	1	1	1	2	2	1	1	0	94	81	78	94	96	93	86	84	85	83	81	89	91	999	999	110	103	99	105	102	94	86	103	102	107	106	101	104
50	2	19	2	42	1	1	1	1	1	1	1	1	0	85	70	72	68	63	78	75	81	84	82	87	89	90	86	999	115	108	106	103	98	93	97	105	113	109	116	114	111
51	2	38	2	47	1	1	1	1	1	1	1	1	0	81	72	70	75	68	62	54	46	72	78	84	79	78	83	999	117	113	105	101	98	93	88	76	112	108	104	100	98
52	2	27	2	54	1	1	1	1	1	1	1	1	0	76	58	63	84	85	87	82	79	76	74	79	75	83	87	999	121	124	116	119	115	108	104	101	98	95	103	108	105
53	2	35	2	48	1	1	1	1	1	1	1	1	0	109	116	94	89	85	82	79	83	86	89	94	97	92	999	999	113	117	108	102	98	95	94	98	104	109	112	115	113
54	2	31	2	51	1	1	1	1	1	1	1	1	0	92	109	84	95	93	75	68	65	62	69	71	73	75	72	999	108	114	107	99	91	84	113	119	108	103	101	98	102
55	2	23	2	45	1	1	1	1	1	1	1	1	0	82	75	83	74	68	65	74	79	81	86	89	87	93	94	999	107	112	105	117	122	106	104	102	99	95	94	106	111
56	2	21	2	48	1	1	1	1	1	1	1	1	0	77	65	64	79	88	94	97	93	99	104	96	94	95	999	999	114	125	107	119	94	81	113	118	108	103	101	98	96
57	2	20	2	43	1	1	1	1	1	1	1	1	0	88	75	82	94	81	72	65	54	45	79	84	86	83	81	999	119	108	107	114	111	105	98	95	82	113	122	109	103
58	2	29	2	44	1	1	1	1	1	1	1	1	0	107	112	98	118	96	95	91	89	87	86	83	87	89	93	999	134	127	114	118	112	107	103	100	96	93	97	102	107
59	2	25	2	58	1	1	1	1	2	1	1	1	0	84	73	71	68	65	61	69	73	78	75	79	82	85	999	999	125	115	109	104	96	95	93	81	105	114	106	109	116
60	2	25	2	58	1	1	1	1	2	1	1	1	0	84	73	71	68	65	61	69	73	78	75	79	82	85	999	999	125	115	109	104	96	95	93	81	105	114	106	109	116
																											s														

SBP50MIN	SBP60MIN	DBPBL	DBPAASD	DBPBLI	DBP ALI	DBP1MIN	DBP3MIN	DBP5MIN	DBP10MIN	DBP15MIN	DBP20MIN	DBP25MIN	DBP30MIN	DBP40MIN	DBP50MIN	DBP60MIN	SPOBL	SPOAASD	SPO BLI	SPO ALI	SPO1MIN	SPO3MIN	SPO5MIN	SPO10MIN	SPO15MIN	SPO20MIN	SPO25MIN	SPO30MIN	SPO40MIN	SPO50MIN	SPO60MIN	EPDRNE	ATROPIN	DURATN
112	113	73	68	64	75	78	81	79	76	73	72	67	68	70	65	64	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	0	0	60
999	999	74	76	68	70	73	74	76	79	77	67	76	75	999	999	999	99	100	100	100	100	100	100	100	100	100	100	100	999	999	999	0	0	30
999	999	86	82	65	77	78	75	78	77	79	82	78	76	72	999	999	97	99	100	100	100	100	100	100	100	100	100	100	100	999	999	0	0	40
111	999	71	68	64	73	56	58	74	68	71	65	62	60	65	67	999	98	100	100	100	100	100	100	100	100	99	100	100	100	99	999	6	0	50
999	999	75	82	53	64	58	60	64	61	63	68	65	64	67	999	999	99	100	100	100	99	100	99	99	100	100	100	100	99	999	999	0	0	40
110	999	67	62	54	56	55	78	73	64	63	64	67	68	65	67	999	100	100	100	100	100	100	99	100	100	100	99	99	100	100	999	0	0	50
999	999	65	67	65	66	72	74	68	67	63	62	61	63	65	999	999	98	100	100	100	99	99	98	99	98	99	99	99	98	999	999	0	0	40
98	102	68	67	72	73	56	52	48	56	63	71	73	75	68	65	69	100	100	100	100	100	100	99	99	100	100	99	100	99	100	100	6	0	60
999	999	73	74	62	68	69	71	70	71	66	68	67	68	69	999	999	99	100	100	100	100	100	99	100	99	99	100	100	100	999	999	0	0	40
113	999	69	72	68	51	46	48	69	68	67	65	64	65	67	68	999	100	100	100	100	100	100	99	99	99	100	99	100	99	99	999	6	0	50
119	999	74	69	66	76	78	71	73	69	68	67	68	69	71	74	999	99	100	100	100	100	100	100	100	100	99	100	99	99	99	999	0	0	50
999	999	84	86	65	86	89	84	83	78	76	75	76	81	78	999	999	98	100	100	100	100	100	100	99	100	99	99	100	100	999	999	0	0	40
134	999	78	81	63	65	69	76	75	76	73	76	75	79	81	83	999	99	100	100	100	100	100	100	99	100	100	99	100	100	99	999	0	0	50
999	999	86	84	76	78	79	77	76	75	78	77	82	83	79	999	999	98	100	100	100	100	100	99	100	100	99	99	99	99	999	999	0	0	40
105	999	72	75	65	75	72	73	72	73	74	72	74	73	74	75	999	99	100	100	100	100	100	100	99	100	100	100	100	100	100	999	0	0	50
126	999	75	79	72	74	67	65	63	66	65	69	82	84	82	80	999	99	100	100	100	100	100	99	98	98	97	98	99	99	98	999	0	0	50
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